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SOUTH AFRICA

WITZENBERG MUNICIPALITY

SAMPLE : **22 Samples of Water, marked**

1. **WBWMCR-001 : Reservoir. Final. Post-Chlorination ex Ceres**
2. **WBWMCR-002 : Wastewater Treatment Works ex Ceres – No sample received**
3. **WBWMCR-003 : Nduli Intermediate School ex Ceres**
4. **WBWMCR-004 : John Steyn Library ex Ceres**
5. **WBWMCR-005 : Bella Vista Clinic ex Ceres**
6. **WBWMCR-006 : 41 Chris Hani ex Ceres**

DATE RECEIVED : **11 January 2010**

OUR REF. : **cc/sc/148/2/2/78**
12 January 2010

LAB DATA SHEET NO. : 10/22

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	6.02	-	5.91	5.87	5.89	5.80	5.0-9.5	4.0-10.0	No Limit [c]
pHs (at 20 deg.C)	-	-	-	-	-	-			
Conductivity (at 25°C) (mS/m)	3.8	-	3.8	4.0	3.8	3.8	<150	150-370	7 years
Turbidity (NTU)	0.98	-	1.6	0.97	1.1	1.1	<1	1-5	No Limit [d]
Odour (Threshold Odour Number)	-	-	-	-	-	-	<5	5-10	No Limit [b]
Langelier Saturation Index	-4.15	-	-4.23	-4.06	-4.16	-4.55	-	-	-
Ryznar Index	-	-	-	-	-	-	-	-	-
Corrosivity Ratio	-	-	-	-	-	-	-	-	-
Sodium Absorption Ratio	-	-	-	-	-	-	-	-	-
% Sodium	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	43	-	33	27	30	31	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-54.5	-	-68.6	-74.3	-71.4	-60.3	-	-	-
Total Alkalinity (as $CaCO_3$)	12.0	-	12.0	12.0	12.0	8.0	-	-	-
Total Hardness (as $CaCO_3$)	8.2	-	9.2	10.3	9.6	8.6	-	-	-
Calcium Hardness (as $CaCO_3$)	3.3	-	3.5	5.8	4.3	3.3	-	-	-
Calcium (as Ca)	1.3	-	1.4	2.3	1.7	1.3	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	4.9	-	5.7	4.5	5.3	5.3	-	-	-
Magnesium (as Mg)	1.2	-	1.4	1.1	1.3	1.3	<70	70-100	7 years
Sodium (as Na)	5.8	-	5.8	5.8	5.8	5.8	<200	200-400	7 years
Potassium (as K)	0.33	-	0.22	0.22	0.22	0.22	<50	50-100	7 years
Zinc (as Zn)	<0.01	-	0.03	0.02	<0.01	0.03	<5.0	5.0-10.0	1 year
Chloride (as Cl)	11.7	-	7.8	7.8	7.8	7.8	<200	200-600	7 years
Fluoride (as F)	<0.1	-	<0.1	<0.1	<0.1	0.15	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4.0	-	<4.0	<4.0	<4.0	<4.0	<400	400-600	7 years

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	30	-	30	30	30	30	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	<0.15	-	<0.15	<0.15	<0.15	<0.15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0.36	-	0.37	0.49	0.49	0.45	<10	10-20	7 years
Nitrate Nitrogen (as N)	0.36	-	0.37	0.49	0.49	0.45	-	-	-
Nitrite Nitrogen (as N)	<0.08	-	<0.08	<0.08	<0.08	<0.08	-	-	-
Boron (as B)	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon (as C)	-	-	-	-	-	-	<10	10-20	3 months[e]
Chemical Oxygen Demand	-	-	-	-	-	-	-	-	-
Chemical Oxygen Demand (Filt.)	-	-	-	-	-	-	-	-	-
Total Phosphate (as P)	-	-	-	-	-	-	-	-	-
Ortho Phosphate (as P)	-	-	-	-	-	-	-	-	-
Sulphide (as S)	-	-	-	-	-	-	-	-	-
Oil & Grease	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	-	-	-	-	-	-	-	-	-
Free Chlorine	-	-	-	-	-	-			
Total Chlorine	-	-	-	-	-	-			
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	100	-	220	180	180	116	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	-	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	60	-	100	60	108	76	<300	300-500	1 year
Copper (as Cu)	-	-	-	-	-	-	<1000	1000-2000	1 year
Nickel (as Ni)	-	-	-	-	-	-	<150	150-350	1 year
Cobalt (as Co)	-	-	-	-	-	-	<500	500-1000	1 year
Chromium (as Cr)	-	-	-	-	-	-	<100	100-500	3 months
Cadmium (as Cd)	-	-	-	-	-	-	<5	5-10	6 months
Lead (as Pb)	-	-	-	-	-	-	<20	20-50	3 months
Cyanide (as CN^-)	-	-	-	-	-	-	<50	50-70	1 week
Arsenic (as As)	-	-	-	-	-	-	<10	10-50	1 year
Mercury (as Hg)	-	-	-	-	-	-	<1	1-5	3 months
Selenium (as Se)	-	-	-	-	-	-	<20	20-50	1 year
Vanadium (as V)	-	-	-	-	-	-	<200	200-500	1 year
Antimony (as Sb)	-	-	-	-	-	-	<10	10-50	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

UDF = Undefined.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	**1**	**2**	**3**	**4**	**5**	**6**	**Allowable Compliance Contribution [e]**		
							95% of samples, min.	**4% of samples, max.**	**1% of samples, max.**
							Upper Limits		
E.coli **[f] (count/100 ml)**	Nil	-	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] (count/100 ml)	Nil	-	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] (count/ml)	5	-	20	2	1	2	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

Samples of Water, marked

7. **WBWMOD-001 : 469 River Singel ex Op-die-Berg**
8. **WBWMOD-002 : Clinic ex Op-die-Berg**
9. **WBWMOD-003 : Tap ex Op-die-Berg**
10. **WBWMPR-001 : Reservoir. Post-Chlorination ex Prince Alfred Hamlet**
11. **WBWMPR-002 : 266 Steve Tshewete St. Kliprug ex Prince Alfred Hamlet**
12. **WBWMPR-003 : Municipal Offices ex Prince Alfred Hamlet**

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)							5.0-9.5	4.0-10.0	No Limit [c]
pHs (at 20 deg.C)	-	-	-	-	-	-			
Conductivity (at 25°C) (mS/m)	5.9	6.0	6.0	60.7	20.0	34.8	<150	150-370	7 years
Turbidity (NTU)	0.33	0.48	0.33	7.3	1.6	1.1	<1	1-5	No Limit [d]
Odour (Threshold Odour Number)	-	-	-	-	-	-	<5	5-10	No Limit [b]
Langelier Saturation Index	undef	undef	undef	-1.72	-2.74	-2.44	-	-	-
Ryznar Index	-	-	-	-	-	-	-	-	-
Corrosivity Ratio	-	-	-	-	-	-	-	-	-
Sodium Absorption Ratio	-	-	-	-	-	-	-	-	-
% Sodium	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	7	8	4	7	9	9	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	undef	undef	undef	-234	-117	-99.7	-	-	-
Total Alkalinity (as $CaCO_3$)	<1.0	<1.0	<1.0	92.0	28.0	28.0	-	-	-
Total Hardness (as $CaCO_3$)	11.7	10.7	11.7	304	73.8	137	-	-	-
Calcium Hardness (as $CaCO_3$)	6.0	4.5	6.0	199	48.8	92.3	-	-	-
Calcium (as Ca)	2.4	1.8	2.4	79.5	19.5	36.9	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	5.7	6.2	5.7	105	25.0	45.1	-	-	-
Magnesium (as Mg)	1.4	1.5	1.4	25.5	6.1	11.0	<70	70-100	7 years
Sodium (as Na)	7.8	7.8	7.8	97.4	23.7	45.2	<200	200-400	7 years
Potassium (as K)	0.33	0.33	0.33	1.4	0.66	0.88	<50	50-100	7 years
Zinc (as Zn)	0.02	0.12	0.08	0.08	0.01	0.02	<5.0	5.0-10.0	1 year
Chloride (as Cl)	7.8	9.7	9.7	183.0	48.5	93.2	<200	200-600	7 years
Fluoride (as F)	<0.1	<0.1	0.19	<0.1	<0.1	0.14	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4.0	<4.0	<4.0	73.0	11.0	30.0	<400	400-600	7 years

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	40	40	40	410	140	240	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	1.6	1.4	1.6	0.19	0.16	0.10	<10	10-20	7 years
Nitrate Nitrogen (as N)	1.6	1.4	1.6	0.19	0.16	0.1	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
Boron (as B)	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon (as C)	-	-	-	-	-	-	<10	10-20	3 months[e]
Chemical Oxygen Demand	-	-	-	-	-	-	-	-	-
Chemical Oxygen Demand (Filt.)	-	-	-	-	-	-	-	-	-
Total Phosphate (as P)	-	-	-	-	-	-	-	-	-
Ortho Phosphate (as P)	-	-	-	-	-	-	-	-	-
Sulphide (as S)	-	-	-	-	-	-	-	-	-
Oil & Grease	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	-	-	-	-	-	-	-	-	-
Free Chlorine	-	-	-	-	-	-			
Total Chlorine	-	-	-	-	-	-			
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	100	40	20	500	180	210	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	820	140	150	<100	100-1 000	7 years
Aluminium (as Al)	120	132	134	20	60	40	<300	300-500	1 year
Copper (as Cu)	-	-	-	-	-	-	<1000	1000-2000	1 year
Nickel (as Ni)	-	-	-	-	-	-	<150	150-350	1 year
Cobalt (as Co)	-	-	-	-	-	-	<500	500-1000	1 year
Chromium (as Cr)	-	-	-	-	-	-	<100	100-500	3 months
Cadmium (as Cd)	-	-	-	-	-	-	<5	5-10	6 months
Lead (as Pb)	-	-	-	-	-	-	<20	20-50	3 months
Cyanide (as CN^-)	-	-	-	-	-	-	<50	50-70	1 week
Arsenic (as As)	-	-	-	-	-	-	<10	10-50	1 year
Mercury (as Hg)	-	-	-	-	-	-	<1	1-5	3 months
Selenium (as Se)	-	-	-	-	-	-	<20	20-50	1 year
Vanadium (as V)	-	-	-	-	-	-	<200	200-500	1 year
Antimony (as Sb)	-	-	-	-	-	-	<10	10-50	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

UDF = Undefined

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	**7**	**8**	**9**	**10**	**11**	**12**	**Allowable Compliance Contribution [e]**		
							95% of samples, min.	**4% of samples, max.**	**1% of samples, max.**
							Upper Limits		
E.coli **[f] (count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] (count/100 ml)	Nil	2	Nil	22	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] (count/ml)	Nil	Nil	Nil	1428	1	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

Samples of Water, marked :

13. **WBWMPR-004 : Tap ex Prince Alfred Hamlet**
14. **WBWMTB-001 : Water Treatment Works. Final ex Tulbagh**
15. **WBWMTB-002 : Municipal Office ex Tulbagh**
16. **WBWMTB-003 : Bloekombossie Restaurant ex Tulbagh - No sample received**
17. **WBWMTB-004 : Central Town ex Tulbagh**
18. **WBWMTB-005 : Clinic ex Tulbagh**

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	6.06	9.89	7.31	-	7.23	7.43	5.0-9.5	4.0-10.0	No Limit [c]
pHs (at 20 deg.C)	-	-	-	-	-	-			
Conductivity (at 25°C) (mS/m)	35.1	21.5	9.5	-	9.3	10.2	<150	150-370	7 years
Turbidity (NTU)	1.7	2.3	3.2	-	2.9	3.3	<1	1-5	No Limit [d]
Odour (Threshold Odour Number)	-	-	-	-	-	-	<5	5-10	No Limit [b]
Langelier Saturation Index	-2.17	1.8	-2.21	-	-2.27	-1.96	-	-	-
Ryznar Index	-	-	-	-	-	-	-	-	-
Corrosivity Ratio	-	-	-	-	-	-	-	-	-
Sodium Absorption Ratio	-	-	-	-	-	-	-	-	-
% Sodium	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	8	15	20	-	15	24	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-141	41.2	-7.8	-	-8.3	-8.1	-	-	-
Total Alkalinity (as $CaCO_3$)	48.0	72.0	16.0	-	16.0	24.0	-	-	-
Total Hardness (as $CaCO_3$)	140	80.8	23.5	-	24.8	30.1	-	-	-
Calcium Hardness (as $CaCO_3$)	94.0	79.0	12.0	-	12.5	10.8	-	-	-
Calcium (as Ca)	37.6	31.6	4.8	-	5.0	4.3	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	46.3	1.8	11.5	-	12.3	19.3	-	-	-
Magnesium (as Mg)	11.3	0.44	2.8	-	3.0	4.7	<70	70-100	7 years
Sodium (as Na)	45.4	14.9	14.3	-	14.3	14.5	<200	200-400	7 years
Potassium (as K)	0.88	0.44	0.44	-	0.44	0.55	<50	50-100	7 years
Zinc (as Zn)	0.06	<0.01	<0.01	-	<0.01	<0.01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	91.3	17.5	19.4	-	19.4	19.4	<200	200-600	7 years
Fluoride (as F)	<0.1	<0.1	<0.1	-	<0.1	0.28	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	29.0	<4.0	<4.0	-	<4.0	<4.0	<400	400-600	7 years

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	240	150	70	-	70	70	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	<0.15	<0.15	<0.15	-	<0.15	<0.15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	<0.05	<0.05	<0.05	-	<0.05	<0.05	<10	10-20	7 years
Nitrate Nitrogen (as N)	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	-	<0.08	<0.08	-	-	-
Boron (as B)	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon (as C)	-	-	-	-	-	-	<10	10-20	3 months[e]
Chemical Oxygen Demand	-	-	-	-	-	-	-	-	-
Chemical Oxygen Demand (Filt.)	-	-	-	-	-	-	-	-	-
Total Phosphate (as P)	-	-	-	-	-	-	-	-	-
Ortho Phosphate (as P)	-	-	-	-	-	-	-	-	-
Sulphide (as S)	-	-	-	-	-	-	-	-	-
Oil & Grease	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	-	-	-	-	-	-	-	-	-
Free Chlorine	-	-	-	-	-	-			
Total Chlorine	-	-	-	-	-	-			
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	220	120	118	-	180	222	<200	200-2 000	7 years [b]
Manganese (as Mn)	160	<40	100	-	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	40	204	300	-	240	180	<300	300-500	1 year
Copper (as Cu)	-	-	-	-	-	-	<1000	1000-2000	1 year
Nickel (as Ni)	-	-	-	-	-	-	<150	150-350	1 year
Cobalt (as Co)	-	-	-	-	-	-	<500	500-1000	1 year
Chromium (as Cr)	-	-	-	-	-	-	<100	100-500	3 months
Cadmium (as Cd)	-	-	-	-	-	-	<5	5-10	6 months
Lead (as Pb)	-	-	-	-	-	-	<20	20-50	3 months
Cyanide (as CN^-)	-	-	-	-	-	-	<50	50-70	1 week
Arsenic (as As)	-	-	-	-	-	-	<10	10-50	1 year
Mercury (as Hg)	-	-	-	-	-	-	<1	1-5	3 months
Selenium (as Se)	-	-	-	-	-	-	<20	20-50	1 year
Vanadium (as V)	-	-	-	-	-	-	<200	200-500	1 year
Antimony (as Sb)	-	-	-	-	-	-	<10	10-50	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

UDF = Undefined.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	13	14	15	16	17	18	Allowable Compliance Contribution [e] 95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	-	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	-	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	Nil	1	1	-	Nil	22	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

Samples of Water, marked :

19 WBWMTB-006 : Wastewater Treatment Works Tap ex Tulbagh

20 WBWMTB-007 : Shell Garage. Main Road ex Tulbagh

21 WBWMWO-001 : Water Treatment Works. Final ex Wolseley

22 WBWMWO-002 : No. 4. NPK. Pine Valley ex Wolseley

23 WBWMWO-003 : Municipal Office ex Wolseley

24 WBWMWO-004 : stamperstraat reservoir

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	7.18	7.07	5.48	5.25	5.04	4.89	5.0-9.5	4.0-10.0	No Limit [c]
pHs (at 20 deg.C)	-	-	-	-	-	-			
Conductivity (at 25°C) (mS/m)	9.3	9.5	2.5	2.7	2.6	2.6	<150	150-370	7 years
Turbidity (NTU)	2.8	3.4	0.44	1.1	2.1	0.37	<1	1-5	No Limit [d]
Odour (Threshold Odour Number)	-	-	-	-	-	-	<5	5-10	No Limit [b]
Langelier Saturation Index	-2.35	-2.35	-5.39	-5.46	-5.72	undef	-	-	-
Ryznar Index	-	-	-	-	-	-	-	-	-
Corrosivity Ratio	-	-	-	-	-	-	-	-	-
Sodium Absorption Ratio	-	-	-	-	-	-	-	-	-
% Sodium	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	16	13	2	<1	<1	<1	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-8.8	-11.2	-65.3	-107	-165	undef	-	-	-
Total Alkalinity (as $CaCO_3$)	16.0	20.0	4.0	4.0	4.0	<1	-	-	-
Total Hardness (as $CaCO_3$)	23.3	24.3	1.9	2.8	2.5	2.5	-	-	-
Calcium Hardness (as $CaCO_3$)	11.8	12.0	1.9	2.8	2.5	2.5	-	-	-
Calcium (as Ca)	4.7	4.8	0.77	1.1	0.99	0.99	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	11.5	12.3	<1.0	<1.0	<1.0	<1.0	-	-	-
Magnesium (as Mg)	2.8	3.0	<0.3	<0.3	<0.3	<0.3	<70	70-100	7 years
Sodium (as Na)	14.7	14.7	3.2	3.3	3.3	3.2	<200	200-400	7 years
Potassium (as K)	0.44	0.44	<0.09	<0.09	<0.09	<0.09	<50	50-100	7 years
Zinc (as Zn)	<0.01	<0.01	<0.01	0.02	<0.01	0.06	<5.0	5.0-10.0	1 year
Chloride (as Cl)	19.4	19.4	5.8	5.8	5.8	3.9	<200	200-600	7 years
Fluoride (as F)	0.12	0.10	<0.1	0.35	0.11	<0.1	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<400	400-600	7 years

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	70	70	20	20	20	20	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	0.48	<0.15	<0.15	<0.15	0.38	0.44	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	10-20	7 years
Nitrate Nitrogen (as N)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
Boron (as B)	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon (as C)	-	-	-	-	-	-	<10	10-20	3 months[e]
Chemical Oxygen Demand	-	-	-	-	-	-	-	-	-
Chemical Oxygen Demand (Filt.)	-	-	-	-	-	-	-	-	-
Total Phosphate (as P)	-	-	-	-	-	-	-	-	-
Ortho Phosphate (as P)	-	-	-	-	-	-	-	-	-
Sulphide (as S)	-	-	-	-	-	-	-	-	-
Oil & Grease	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	-	-	-	-	-	-	-	-	-
Free Chlorine	-	-	-	-	-	-			
Total Chlorine	-	-	-	-	-	-			
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	180	172	120	56	160	120	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	280	208	46	70	130	60	<300	300-500	1 year
Copper (as Cu)	-	-	-	-	-	-	<1000	1000-2000	1 year
Nickel (as Ni)	-	-	-	-	-	-	<150	150-350	1 year
Cobalt (as Co)	-	-	-	-	-	-	<500	500-1000	1 year
Chromium (as Cr)	-	-	-	-	-	-	<100	100-500	3 months
Cadmium (as Cd)	-	-	-	-	-	-	<5	5-10	6 months
Lead (as Pb)	-	-	-	-	-	-	<20	20-50	3 months
Cyanide (as CN^-)	-	-	-	-	-	-	<50	50-70	1 week
Arsenic (as As)	-	-	-	-	-	-	<10	10-50	1 year
Mercury (as Hg)	-	-	-	-	-	-	<1	1-5	3 months
Selenium (as Se)	-	-	-	-	-	-	<20	20-50	1 year
Vanadium (as V)	-	-	-	-	-	-	<200	200-500	1 year
Antimony (as Sb)	-	-	-	-	-	-	<10	10-50	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

UND = Undefined.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	19	20	21	22	23	24	Allowable Compliance Contribution [e] 95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	4	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	Nil	882	Nil	Nil	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

.....
T.R. DAVIES Pr.Sci.Nat.
Chartered Water & Environmental Manager
DIRECTOR

148/2/2/78
12 January 2010

TO : WITZENBERG MUNICIPALITY
P O Box 44
CERES
6835

Attention : MR JOHAN SWANEPOEL

APPENDIX 1 : Specific Methods used for the Analysis of Parameters indicated in this report.

Parameter	Method	Estimated Uncertainty (%)
pH (at 25 deg.C) - Lab	SABS 11 : (1990 – 3rd Revision)	0,019
pH (at 25 deg.C) – Field*	SABS 11 : (1990 – 3rd Revision)	-
Langelier Saturation Index (at 25 deg.C)*	Calculation	-
Conductivity (mS/m) (at 25 deg.C)	STD Method 2501 A (1992)	2,15
Turbidity (NTU)	Hach 8237	1,81
Colour (mg/l as Pt)*	Hach 8025	-
Total Alkalinity (mg/l as $CaCO_3$)*	STD Methods 2320 (1992)	-
Total Hardness (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Calcium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Magnesium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,08
Chloride (mg/l as Cl)	SABS 202 (2nd Revision)	0,08
Fluoride (mg/l as F)	Hach 8029	0,19
Iron (µg/l as Fe)	SANS 5207 (2004)	0,09
Manganese (µg/l as Mn)	SANS 5209 (2005)	0,09
Aluminium (µg/l as Al)	SANS 6169 (2005)	0,14
Calcium Carbonate Precipitation Potential*	Calculation	-
Free Chlorine (mg/l)*	Lovibond Method 3	-
Sodium (mg/l as Na)	SANS 6050 (2004)	0,08
Potassium (mg/l as K)	STD Method 3111 B (1992)	0,07
Zinc (mg/l as Zn)*	SANS 5214 (2005)	0,08
Nitrate Nitrogen (mg/l as N)	Hach 8150	0,12
Nitrate Nitrogen (mg/l as N)	Lovibond Method using Brucine	0,057
Nitrite Nitrogen (mg/l as N) *	Lovibond Method	0,08
Nitrate & Nitrite Nitrogen (mg/l as N)*	Hach 8150	-
Ammonia (mg/l as N)	STD Method 4500-NH_3:C (1992)	0,07
Sulphate (mg/l as SO4)	Hach 8051	0,17
Total Dissolved Solids*	STD Method 2501 A (1992)	1,63
E.coli (organisms per 100 ml)*	SABS 221 (2002)	-
Coliforms (organisms per 100 ml)*	SABS 221 (2002)	-
Total Plate Count (organisms per ml)*	Petrifilm ™	-
Faecal coliforms (organisms per 100 ml)*	SABS SM 221 (2002)	-
Settleable Solids (ml/l)*	STD Method 2540 F (1992)	-

Chemical Oxygen Demand (mg/l)	SANS 6048 (2005)	0,08
Total Kjeldahl Nitrogen (mg/l)*	Hach 8075	-
Dissolved Oxygen (mg/l)*	STD Method 4500 O-G	-
Total Suspended Solids (mg/l)*	STD Method 2540 D (1992)	-
Volatile Suspended Solids (mg/l)*	STD Method 2540 E (1992)	-
Total Phosphorus (mg/l as P)*	STD Method 4500-PB (1992) / Hach 8114	-
Ortho Phosphorus (mg/l as P)*	Hach 8114	-
Copper (µg/l as Cu)	SANS 5203 (2005)	0,13

*** Tests marked "Not SANAS Accredited" in this report are not included in the SANAS Schedule of Accreditation for this laboratory.**

(Schedule of Accreditation excludes sampling)

A.L. ABBOTT AND ASSOCIATES (PTY) LTD

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P.O. Box 483
WOODSTOCK, CAPE
7915
SOUTH AFRICA

Certificate of Analysis

WITZENBERG MUNICIPALITY

SAMPLE : **Five Samples of Water (Resampling)**

DATE RECEIVED : **13 September 2010**

OUR REF. : **sc/148/2/2/3135** **B DATA SHEET NO. : 10/2407**
15 September 2010

Sample Marked :	Ceres John Steyn Library	Wolseley Water Treatment Works	Wolseley Pine Valley	Wolseley Municipal Office	Stamperstraat Reservoir
E.coli (organisms per 100 ml)	Nil	Nil	Nil	Nil	Nil
Coliforms (organisms per 100 ml)	Nil	Nil	Nil	Nil	Nil
Total Plate Count (organisms per ml)	Nil	Nil	Nil	Nil	Nil

……
N. VAN BINSBERGEN Pr.Sci.Nat.
DIRECTOR

TO : **WITZENBERG MUNICIPALITY**
P O Box 44
CERES
6835

Attention : MS S. FARMER

APPENDIX 1 : Specific Methods used for the Analysis of Parameters indicated in this report.

Parameter	Method	Estimated Uncertainty (%)
pH (at 25 °C) - Lab	SABS 11 : (1990 – 3rd Revision)	0,019
pH (at 25 °C) – Field*	SABS 11 : (1990 – 3rd Revision)	-
Langelier Saturation Index (at 25 °C)*	Calculation	-
Conductivity (mS/m) (at 25 °C)	STD Method 2501 A (1992)	2,15
Turbidity (NTU)	Hach 8237	1,81
Colour (mg/l as Pt)*	Hach 8025	-
Total Alkalinity (mg/l as $CaCO_3$)*	STD Methods 2320 (1992)	-
Total Hardness (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Calcium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Magnesium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,08
Chloride (mg/l as Cl)	SABS 202 (2nd Revision)	0,08
Fluoride (mg/l as F)	Hach 8029	0,19
Iron (µg/l as Fe)	SANS 5207 (2004)	0,09
Manganese (µg/l as Mn)	SANS 5209 (2005)	0,09
Aluminium (µg/l as Al)	SANS 6169 (2005)	0,14
Calcium Carbonate Precipitation Potential*	Calculation	-
Free Chlorine (mg/l)*	Lovibond Method 3	-
Sodium (mg/l as Na)	SANS 6050 (2004)	0,08
Potassium (mg/l as K)	STD Method 3111 B (1992)	0,07
Zinc (mg/l as Zn)	SANS 5214 (2005)	0,08
Nitrate Nitrogen (mg/l as N)	Hach 8150	0,12
Nitrate Nitrogen (mg/l as N)	Lovibond Method using Brucine	0,057
Nitrite Nitrogen (mg/l as N)	Lovibond Method	0,08
Nitrate & Nitrite Nitrogen (mg/l as N)	Hach 8150	-
Ammonia (mg/l as N)	STD Method 4500-NH_3:C (1992)	0,07
Sulphate (mg/l as SO4)	Hach 8051	0,17
Total Dissolved Solids*	STD Method 2501 A (1992)	1,63
E.coli (organisms per 100 ml)	SABS 221 (2002)	-
Coliforms (organisms per 100 ml)	SABS 221 (2002)	-
Total Plate Count (organisms per ml)	Petrifilm ™	-
Faecal coliforms (organisms per 100 ml)	SABS SM 221 (2002)	-
Settleable Solids (ml/l)*	STD Method 2540 F (1992)	-
Chemical Oxygen Demand (mg/l)	SANS 6048 (2005)	0,08
Total Kjeldahl Nitrogen (mg/l)*	Hach 8075	-
Dissolved Oxygen (mg/l)*	STD Method 4500 O-G	-
Total Suspended Solids (mg/l)*	STD Method 2540 D (1992)	-
Volatile Suspended Solids (mg/l)*	STD Method 2540 E (1992)	-
Total Phosphate (mg/l as P)*	STD Method 4500-PB (1992) / Hach 8114	-
Ortho Phosphate (mg/l as P)*	Hach 8114	-
Copper (µg/l as Cu)	SANS 5203 (2005)	0,13

*** Tests marked "Not SANAS Accredited" in this report are not included in the SANAS Schedule of Accreditation for this laboratory.**

(Schedule of Accreditation excludes sampling)

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WOODSTOCK, CAPE
7915
SOUTH AFRICA

Certificate of Analysis

WITZENBERG MUNICIPALITY

SAMPLE : **24 Samples of Drinking Water, marked**

1. **WBWMCR-001 : Reservoir. Final. Post-Chlorination ex Ceres**
2. **WBWMCR-002 : Wastewater Treatment Works ex Ceres (No Sample Received)**
3. **WBWMCR-003 : Nduli Intermediate School ex Ceres**
4. **WBWMCR-004 : John Steyn Library ex Ceres**
5. **WBWMCR-005 : Bella Vista Clinic ex Ceres**
6. **WBWMCR-006 : 41 Chris Hani ex Ceres**

DATE RECEIVED : **4 October 2010**

OUR REF. : **sc/148/2/2/3614**
7 October 2010

LAB DATA SHEET NO. : 10/2614

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	6,32	6,14	6,10	6,13	6,13	6,03	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	3,4	3,5	3,3	3,9	3,5	3,4	<150	150-370	7 years
Turbidity (NTU)	1,3	1,1	1,1	1,5	1,4	1,2	<1	1-5	No Limit [d]
Langelier Saturation Index	-4,14	-3,75	-4,36	-3,79	-4,33	-4,43	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	3	4	3	4	9	2	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	4,0	12,0	4,0	8,0	4,0	4,0	-	-	-
Total Hardness (as $CaCO_3$)	9,9	11,6	10,3	13,7	9,9	9,9	-	-	-
Calcium Hardness (as $CaCO_3$)	5,0	6,3	5,0	8,8	5,0	5,0	-	-	-
Calcium (as Ca)	2,0	2,5	2,0	3,5	2,0	2,0	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	4,9	5,3	5,3	4,9	4,9	4,9	-	-	-
Magnesium (as Mg)	1,2	1,3	1,3	1,2	1,2	1,2	<70	70-100	7 years
Sodium (as Na)	5,0	5,0	5,0	5,1	5,0	5,0	<200	200-400	7 years
Potassium (as K)	0,44	0,33	0,44	0,33	0,33	0,44	<50	50-100	7 years
Zinc (as Zn)	0,01	0,01	0,03	0,01	0,01	0,02	<5.0	5.0-10.0	1 year
Chloride (as Cl)	10,4	8,3	8,3	6,3	8,3	8,3	<200	200-600	7 years
Fluoride (as F)	<0,10	<0,10	<0,10	<0,10	<0,10	<0,10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<4,0	<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	30	30	30	30	30	30	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0,34	0,39	0,39	0,41	0,41	0,37	<10	10-20	7 years
Nitrate Nitrogen (as N)	0,34	0,39	0,34	0,41	0,41	0,37	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	60	<10	20	20	<10	<10	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	60	60	100	80	100	100	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	1	2	3	4	5	6	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	Nil	216	Nil	44	8	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **7. WBWMOD-001 : 469 River Singel ex Op-die-Berg**
8. WBWMOD-002 : Clinic ex Op-die-Berg
9. WBWMOD-003 : Tap ex Op-die-Berg
10. WBWMPR-001 : Reservoir. Post-Chlorination ex Prince Alfred Hamlet
11. WBWMPR-002 : 266 Steve Tshewete St. Kliprug ex Prince Alfred Hamlet
12. WBWMPR-003 : Municipal Offices ex Prince Alfred Hamlet

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	5,61	5,64	5,53	5,56	5,45	5,40	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	6,3	6,1	6,2	3,0	4,0	3,4	<150	150-370	7 years
Turbidity (NTU)	0,33	0,34	0,43	0,35	0,43	0,60	<1	1-5	No Limit [d]
Langelier Saturation Index	Undef.	Undef.	-4,81	-4,66	-4,94	-4,76	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	<1	<1	<1	<1	<1	<1	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	<1,0	<1,0	4,0	8,0	4,0	8,0	-	-	-
Total Hardness (as $CaCO_3$)	14,9	15,6	14,8	7,5	10,1	9,1	-	-	-
Calcium Hardness (as $CaCO_3$)	6,3	7,8	7,0	4,3	6,0	5,0	-	-	-
Calcium (as Ca)	2,5	3,1	2,8	1,7	2,4	2,0	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	8,6	7,8	7,8	3,2	4,1	4,1	-	-	-
Magnesium (as Mg)	2,1	1,9	1,9	0,77	0,99	0,99	<70	70-100	7 years
Sodium (as Na)	8,3	8,0	8,1	5,0	5,4	5,2	<200	200-400	7 years
Potassium (as K)	0,44	0,33	0,44	0,33	0,55	0,33	<50	50-100	7 years
Zinc (as Zn)	0,01	0,05	<0,01	<0,01	0,02	0,05	<5.0	5.0-10.0	1 year
Chloride (as Cl)	12,5	12,5	12,5	10,4	12,5	8,3	<200	200-600	7 years
Fluoride (as F)	<0,10	<0,10	<0,10	<0,10	<0,10	<0,10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<4,0	<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	50	50	50	30	30	30	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	2,0	1,8	1,8	0,29	0,32	0,28	<10	10-20	7 years
Nitrate Nitrogen (as N)	2,0	1,8	1,8	0,29	0,32	0,28	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	<10	20	<10	<10	40	<10	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	300	300	240	120	60	160	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	7	8	9	10	11	12	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	1496	704	22	Nil	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **13 WBWMPR-004 : Tap ex Prince Alfred Hamlet**
14 WBWMTB-001 : Water Treatment Works. Final ex Tulbagh
15. WBWMTB-002 : Municipal Office ex Tulbagh
16. WBWMTB-003 : Bloekombossie Restaurant ex Tulbagh
17. WBWMTB-004 : Central Town ex Tulbagh
18. WBWMTB-005 : Clinic ex Tulbagh

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	5,44	9,14	8,73	8,60	8,50	8,40	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	3,4	27,0	6,9	6,8	6,9	6,1	<150	150-370	7 years
Turbidity (NTU)	0,49	2,4	2,0	1,2	1,8	2,6	<1	1-5	No Limit [d]
Langelier Saturation Index	-5,02	0,87	-1,08	-1,16	-1,44	-1,44	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	<1	6	11	10	10	12	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	4,0	48,0	12,0	12,0	8,0	12,0	-	-	-
Total Hardness (as $CaCO_3$)	8,6	82,9	15,4	16,2	16,6	15,9	-	-	-
Calcium Hardness (as $CaCO_3$)	5,0	81,5	8,0	8,8	8,8	7,3	-	-	-
Calcium (as Ca)	2,0	32,6	3,2	3,5	3,5	2,9	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	3,6	1,4	7,4	7,4	7,8	8,6	-	-	-
Magnesium (as Mg)	0,88	0,33	1,8	1,8	1,9	2,1	<70	70-100	7 years
Sodium (as Na)	5,2	9,0	9,4	9,6	9,4	9,4	<200	200-400	7 years
Potassium (as K)	0,44	0,44	0,44	0,44	0,44	0,44	<50	50-100	7 years
Zinc (as Zn)	0,03	<0,01	0,02	0,04	<0,01	<0,01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	12,5	16,7	16,7	16,7	16,7	16,7	<200	200-600	7 years
Fluoride (as F)	0,45	0,66	0,36	<0,10	<0,10	0,25	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<4,0	<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	30	180	60	60	60	50	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0,29	<0,05	<0,05	<0,05	<0,05	<0,05	<10	10-20	7 years
Nitrate Nitrogen (as N)	0,29	<0,05	<0,05	<0,05	<0,05	<0,05	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	<10	<10	40	120	20	80	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	80	120	100	100	160	100	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	13	14	15	16	17	18	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	Nil	1	418	3	792	1	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **19 WBWMTB-006 : Wastewater Treatment Works Tap ex Tulbagh**
20 WBWMTB-007 : Shell Garage. Main Road ex Tulbagh
21 WBWMWO-001 : Water Treatment Works. Final ex Wolseley
22 WBWMWO-002 : No. 4. NPK. Pine Valley ex Wolseley
23 WBWMWO-003 : Municipal Office ex Wolseley
24 WBWMWO-004 : stamperstraat reservoir

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	8,34	8,22	8,15	8,05	7,91	7,61	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	6,9	6,8	4,0	1,8	1,7	1,8	<150	150-370	7 years
Turbidity (NTU)	0,77	1,2	1,1	0,57	0,62	0,75	<1	1-5	No Limit [d]
Langelier Saturation Index	-1,34	-1,77	-1,90	Undef.	Undef.	Undef.	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	7	15	2	<1	<1	<1	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	12,0	8,0	16,0	<1,0	<1,0	<1,0	-	-	-
Total Hardness (as $CaCO_3$)	18,6	15,6	6,0	5,1	4,8	4,8	-	-	-
Calcium Hardness (as $CaCO_3$)	10,8	7,8	3,3	3,3	3,0	2,5	-	-	-
Calcium (as Ca)	4,3	3,1	1,3	1,3	1,2	0,99	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	7,8	7,8	2,7	1,8	1,8	2,3	-	-	-
Magnesium (as Mg)	1,9	1,9	0,66	0,44	0,44	0,55	<70	70-100	7 years
Sodium (as Na)	8,9	9,6	2,4	2,3	2,3	2,3	<200	200-400	7 years
Potassium (as K)	0,44	0,44	<0,09	<0,09	<0,09	0,11	<50	50-100	7 years
Zinc (as Zn)	0,03	<0,01	<0,01	0,02	0,01	0,03	<5.0	5.0-10.0	1 year
Chloride (as Cl)	16,7	16,7	8,3	8,3	8,3	8,3	<200	200-600	7 years
Fluoride (as F)	<0,10	<0,10	<0,10	0,16	<0,10	<0,10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<4,0	<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	60	60	30	20	20	20	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	<0,05	<0,05	0,27	<0,05	<0,05	<0,05	<10	10-20	7 years
Nitrate Nitrogen (as N)	<0,05	<0,05	0,27	<0,05	<0,05	<0,05	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	60	60	<10	<10	20	<10	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	44	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	140	100	140	100	140	80	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
							Allowable Compliance Contribution [e]		
Sample Number :	19	20	21	22	23	24	95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] (count/100 ml)	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] (count/100 ml)	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] (count/ml)	1588	352	Nil	Nil	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

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N. VAN BINSBERGEN Pr.Sci.Nat.
DIRECTOR

148/2/2/3614
7 October 2010

TO : WITZENBERG MUNICIPALITY
P O Box 44
CERES
6835

Attention : MR JOHAN SWANEPOEL

APPENDIX 1 : Specific Methods used for the Analysis of Parameters indicated in this report.

Parameter	Method	Estimated Uncertainty (%)
pH (at 25 °C) - Lab	SABS 11 : (1990 – 3rd Revision)	0,019
pH (at 25 °C) – Field*	SABS 11 : (1990 – 3rd Revision)	-
Langelier Saturation Index (at 25 °C)*	Calculation	-
Conductivity (mS/m) (at 25 °C)	STD Method 2501 A (1992)	2,15
Turbidity (NTU)	Hach 8237	1,81
Colour (mg/l as Pt)*	Hach 8025	-
Total Alkalinity (mg/l as $CaCO_3$)*	STD Methods 2320 (1992)	-
Total Hardness (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Calcium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Magnesium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,08
Chloride (mg/l as Cl)	SABS 202 (2nd Revision)	0,08
Fluoride (mg/l as F)	Hach 8029	0,19
Iron (µg/l as Fe)	SANS 5207 (2004)	0,09
Manganese (µg/l as Mn)	SANS 5209 (2005)	0,09
Aluminium (µg/l as Al)	SANS 6169 (2005)	0,14
Calcium Carbonate Precipitation Potential*	Calculation	-
Free Chlorine (mg/l)*	Lovibond Method 3	-
Sodium (mg/l as Na)	SANS 6050 (2004)	0,08
Potassium (mg/l as K)	STD Method 3111 B (1992)	0,07
Zinc (mg/l as Zn)	SANS 5214 (2005)	0,08
Nitrate Nitrogen (mg/l as N)	Hach 8150	0,12
Nitrate Nitrogen (mg/l as N)	Lovibond Method using Brucine	0,057
Nitrite Nitrogen (mg/l as N)	Lovibond Method	0,08
Nitrate & Nitrite Nitrogen (mg/l as N)	Hach 8150	-
Ammonia (mg/l as N)	STD Method 4500-NH_3:C (1992)	0,07
Sulphate (mg/l as SO4)	Hach 8051	0,17
Total Dissolved Solids*	STD Method 2501 A (1992)	1,63
E.coli (organisms per 100 ml)	SABS 221 (2002)	-
Coliforms (organisms per 100 ml)	SABS 221 (2002)	-
Total Plate Count (organisms per ml)	Petrifilm ™	-
Faecal coliforms (organisms per 100 ml)	SABS SM 221 (2002)	-
Settleable Solids (ml/l)*	STD Method 2540 F (1992)	-
Chemical Oxygen Demand (mg/l)	SANS 6048 (2005)	0,08
Total Kjeldahl Nitrogen (mg/l)*	Hach 8075	-
Dissolved Oxygen (mg/l)*	STD Method 4500 O-G	-
Total Suspended Solids (mg/l)*	STD Method 2540 D (1992)	-
Volatile Suspended Solids (mg/l)*	STD Method 2540 E (1992)	-
Total Phosphate (mg/l as P)*	STD Method 4500-PB (1992) / Hach 8114	-
Ortho Phosphate (mg/l as P)*	Hach 8114	-
Copper (µg/l as Cu)	SANS 5203 (2005)	0,13

*** Tests marked "Not SANAS Accredited" in this report are not included in the SANAS Schedule of Accreditation for this laboratory.**

(Schedule of Accreditation excludes sampling)

A.L. ABBOTT AND ASSOCIATES (PTY) LTD

(Reg. No. 1982/004379/07)

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SOUTH AFRICA

Certificate of Analysis

WITZENBERG MUNICIPALITY

SAMPLE : **24 Samples of Drinking Water, marked**

1. **WBWMCR-001 : Reservoir. Final. Post-Chlorination ex Ceres**
2. **WBWMCR-002 : Wastewater Treatment Works ex Ceres (No Sample Received)**
3. **WBWMCR-003 : Nduli Intermediate School ex Ceres**
4. **WBWMCR-004 : John Steyn Library ex Ceres**
5. **WBWMCR-005 : Bella Vista Clinic ex Ceres**
6. **WBWMCR-006 : 41 Chris Hani ex Ceres**

DATE RECEIVED : **4 November 2010**

OUR REF. : **sc/148/2/2/4118** **LAB DATA SHEET NO. : 10/2972**
16 November 2010

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	7,47	6,91	6,84	7,14	6,73	6,60	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	3,0	3,6	3,3	3,7	3,1	3,2	<150	150-370	7 years
Turbidity (NTU)	1,6	2,6	1,1	0,93	1,0	1,0	<1	1-5	No Limit [d]
Langelier Saturation Index	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	14	12	19	18	19	19	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	8,0	8,0	8,0	12,0	8,0	8,0	-	-	-
Total Hardness (as $CaCO_3$)	6,1	9,6	8,3	12,2	8,2	7,4	-	-	-
Calcium Hardness (as $CaCO_3$)	2,5	5,5	3,0	7,3	3,3	2,5	-	-	-
Calcium (as Ca)	0,99	2,2	1,2	2,9	1,3	0,99	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	3,6	4,1	5,3	4,9	4,9	4,9	-	-	-
Magnesium (as Mg)	0,88	0,99	1,3	1,2	1,2	1,2	<70	70-100	7 years
Sodium (as Na)	5,2	5,0	5,2	5,2	5,2	5,2	<200	200-400	7 years
Potassium (as K)	0,33	0,22	0,33	0,33	0,33	0,33	<50	50-100	7 years
Zinc (as Zn)	0,02	0,02	<0,01	<0,01	<0,01	0,01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	8,2	22,7	16,5	8,2	8,2	8,2	<200	200-600	7 years
Fluoride (as F)	<0,10	<0,10	<0,10	<0,10	<0,10	<0,10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<4,0	<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	30	40	30	40	30	30	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0,30	0,31	0,17	0,43	0,29	0,23	<10	10-20	7 years
Nitrate Nitrogen (as N)	0,3	0,31	0,17	0,43	0,29	0,23	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
Dissolved Organic Carbon (as C)	To Follow	-	-	-	-	-	<10	10-20	3 months[e]
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	100	200	140	140	120	160	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	40	50	20	40	20	40	<300	300-500	1 year
Nickel (as Ni)	<8	-	-	-	-	-	<150	150-350	1 year
Cobalt (as Co)	<7	-	-	-	-	-	<500	500-1000	1 year
Copper (as Cu)	<22	-	-	-	-	-	<1000	1000-2000	1 year
Chromium (as Cr)	<10	-	-	-	-	-	<100	100-500	3 months
Cadmium (as Cd)	<1	-	-	-	-	-	<5	5-10	6 months
Lead (as Pb)	<8	-	-	-	-	-	<20	20-50	3 months
Cyanide (as CN^-)	<50	-	-	-	-	-	<50	50-70	1 week
Arsenic (as As)	To Follow	-	-	-	-	-	<10	10-50	1 year
Mercury (as Hg)	To Follow	-	-	-	-	-	<1	1-5	3 months
Selenium (as Se)	To Follow	-	-	-	-	-	<20	20-50	1 year
Vanadium (as V)	To Follow	-	-	-	-	-	<200	200-500	1 year
Antimony (as Sb)	To Follow	-	-	-	-	-	<10	10-50	1 year
Trihalomethanes	To Follow	-	-	-	-	-	<200	200-300	10 years [f]
Phenols	To Follow	-	-	-	-	-	<10	10-70	No Limit [b]

a	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
b	The limits given are based on aesthetic aspects.
c	No primary health effect – low pH values can result in structural problems in the distribution system.
d	These values can indicate process efficiency and risks associated with pathogens.

 LAB DATA SHEET NO. : 10/2972

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
							Allowable Compliance Contribution [e]		
Sample Number :	1	2	3	4	5	6	95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	2	1	9	2	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	1	2	7	19	11	34	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

LAB DATA SHEET NO. : 10/2972

SAMPLE : **7. WBWMOD-001 : 469 River Singel ex Op-die-Berg**
8. WBWMOD-002 : Clinic ex Op-die-Berg
9. WBWMOD-003 : Tap ex Op-die-Berg
10. WBWMPR-001 : Reservoir. Post-Chlorination ex Prince Alfred Hamlet
11. WBWMPR-002 : 266 Steve Tshewete St. Kliprug ex Prince Alfred Hamlet
12. WBWMPR-003 : Municipal Offices ex Prince Alfred Hamlet

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	5,34	5,24	4,94	4,43	5,50	6,29	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	6,1	6,2	6,0	2,7	14,3	35,6	<150	150-370	7 years
Turbidity (NTU)	0,30	0,42	0,25	0,70	0,64	2,2	<1	1-5	No Limit [d]
Langelier Saturation Index	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	2	<1	<1	<1	<1	<1	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	4,0	4,0	<1,0	<1,0	20,0	44,0	-	-	-
Total Hardness (as $CaCO_3$)	12,8	13,4	11,9	5,2	68,5	122	-	-	-
Calcium Hardness (as $CaCO_3$)	5,0	6,0	4,5	2,5	30,0	83,5	-	-	-
Calcium (as Ca)	2,0	2,4	1,8	0,99	12,0	33,4	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	7,8	7,4	7,4	2,7	38,5	38,5	-	-	-
Magnesium (as Mg)	1,9	1,8	1,8	0,66	9,4	9,4	<70	70-100	7 years
Sodium (as Na)	8,0	8,0	8,0	5,0	15,0	36,4	<200	200-400	7 years
Potassium (as K)	0,44	0,44	0,44	0,33	0,66	0,77	<50	50-100	7 years
Zinc (as Zn)	<0,01	0,02	0,02	<0,01	0,02	0,04	<5.0	5.0-10.0	1 year
Chloride (as Cl)	12,4	12,4	14,4	8,2	37,1	82,5	<200	200-600	7 years
Fluoride (as F)	<0,10	0,21	<0,10	0,27	0,11	0,36	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<4,0	<4,0	<4,0	4,0	15,0	<400	400-600	7 years
Total Dissolved Solids	60	60	60	30	110	250	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	1,8	2,0	1,5	0,08	<0,05	0,07	<10	10-20	7 years
Nitrate Nitrogen (as N)	1,8	2	1,5	0,08	<0,05	0,07	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
Dissolved Organic Carbon (as C)	-	-	-	To Follow	-	-	<10	10-20	3 months[e]

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	120	<10	<10	<10	100	180	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	42	116	<100	100-1 000	7 years
Aluminium (as Al)	100	40	100	40	20	<14	<300	300-500	1 year
Nickel (as Ni)	-	-	-	<8	-	-	<150	150-350	1 year
Cobalt (as Co)	-	-	-	<7	-	-	<500	500-1000	1 year
Copper (as Cu)	-	-	-	<22	-	-	<1000	1000-2000	1 year
Chromium (as Cr)	-	-	-	<10	-	-	<100	100-500	3 months
Cadmium (as Cd)	-	-	-	<1	-	-	<5	5-10	6 months
Lead (as Pb)	-	-	-	<8	-	-	<20	20-50	3 months
Cyanide (as CN^-)	-	-	-	<50	-	-	<50	50-70	1 week
Arsenic (as As)	-	-	-	To Follow	-	-	<10	10-50	1 year
Mercury (as Hg)	-	-	-	To Follow	-	-	<1	1-5	3 months
Selenium (as Se)	-	-	-	To Follow	-	-	<20	20-50	1 year
Vanadium (as V)	-	-	-	To Follow	-	-	<200	200-500	1 year
Antimony (as Sb)	-	-	-	To Follow	-	-	<10	10-50	1 year
Trihalomethanes	-	-	-	To Follow	-	-	<200	200-300	10 years [f]
Phenols	-	-	-	To Follow	-	-	<10	10-70	No Limit [b]

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	**7**	**8**	**9**	**10**	**11**	**12**	**Allowable Compliance Contribution [e]**		
							95% of samples, min.	**4% of samples, max.**	**1% of samples, max.**
							Upper Limits		
E.coli **[f] (count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Total Coliform Bacteria [g] (count/100 ml)	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] (count/ml)	8	13	Nil	Nil	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

 LAB DATA SHEET NO. : 10/2972

SAMPLE : **13 WBWMPR-004 : Tap ex Prince Alfred Hamlet**
14 WBWMTB-001 : Water Treatment Works. Final ex Tulbagh
15. WBWMTB-002 : Municipal Office ex Tulbagh
16. WBWMTB-003 : Bloekombossie Restaurant ex Tulbagh
17. WBWMTB-004 : Central Town ex Tulbagh
18. WBWMTB-005 : Clinic ex Tulbagh

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	6,30	9,56	7,95	7,36	7,22	7,07	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	36,9	20,9	7,3	7,7	7,2	6,7	<150	150-370	7 years
Turbidity (NTU)	2,3	1,2	2,5	1,7	1,5	1,2	<1	1-5	No Limit [d]
Langelier Saturation Index	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	<1	12	18	13	13	12	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	48,0	76,0	16,0	12,0	12,0	12,0	-	-	-
Total Hardness (as $CaCO_3$)	123	76,1	19,1	18,0	16,1	16,0	-	-	-
Calcium Hardness (as $CaCO_3$)	84,5	74,3	10,5	9,8	8,3	7,8	-	-	-
Calcium (as Ca)	33,8	29,7	4,2	3,9	3,3	3,1	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	38,5	1,8	8,6	8,2	7,8	8,2	-	-	-
Magnesium (as Mg)	9,4	0,44	2,1	2,0	1,9	2,0	<70	70-100	7 years
Sodium (as Na)	36,3	10,6	11,3	11,1	11,3	11,1	<200	200-400	7 years
Potassium (as K)	0,77	0,44	0,44	0,44	0,44	0,44	<50	50-100	7 years
Zinc (as Zn)	0,04	<0,01	<0,01	0,01	<0,01	0,01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	80,0	20,0	20,0	24,0	24,0	20,0	<200	200-600	7 years
Fluoride (as F)	0,30	0,38	0,23	<0,10	<0,10	0,15	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	18,0	<4,0	<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years
Total Dissolved Solids	260	160	70	70	70	60	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	<10	10-20	7 years
Nitrate Nitrogen (as N)	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
Dissolved Organic Carbon (as C)	-	To Follow	-	-	-	-	<10	10-20	3 months[e]

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	220	120	140	136	80	160	<200	200-2 000	7 years [b]
Manganese (as Mn)	90	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	20	20	20	20	20	40	<300	300-500	1 year
Nickel (as Ni)	-	<8	-	-	-	-	<150	150-350	1 year
Cobalt (as Co)	-	<7	-	-	-	-	<500	500-1000	1 year
Copper (as Cu)	-	<22	-	-	-	-	<1000	1000-2000	1 year
Chromium (as Cr)	-	<10	-	-	-	-	<100	100-500	3 months
Cadmium (as Cd)	-	30	-	-	-	-	<5	5-10	6 months
Lead (as Pb)	-	10	-	-	-	-	<20	20-50	3 months
Cyanide (as CN^-)	-	<50	-	-	-	-	<50	50-70	1 week
Arsenic (as As)	-	To Follow	-	-	-	-	<10	10-50	1 year
Mercury (as Hg)	-	To Follow	-	-	-	-	<1	1-5	3 months
Selenium (as Se)	-	To Follow	-	-	-	-	<20	20-50	1 year
Vanadium (as V)	-	To Follow	-	-	-	-	<200	200-500	1 year
Antimony (as Sb)	-	To Follow	-	-	-	-	<10	10-50	1 year
Trihalomethanes	-	To Follow	-	-	-	-	<200	200-300	10 years [f]
Phenols	-	To Follow	-	-	-	-	<10	10-70	No Limit [b]

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

 LAB DATA SHEET NO. : 10/2972

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	13	14	15	16	17	18	Allowable Compliance Contribution [e] 95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	Nil	Nil	25	Nil	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

 LAB DATA SHEET NO. : 10/2972

SAMPLE : **19 WBWMTB-006 : Wastewater Treatment Works Tap ex Tulbagh**
20 WBWMTB-007 : Shell Garage. Main Road ex Tulbagh
21 WBWMWO-001 : Water Treatment Works. Final ex Wolseley
22 WBWMWO-002 : No. 4. NPK. Pine Valley ex Wolseley
23 WBWMWO-003 : Municipal Office ex Wolseley
24 WBWMWO-004 : stamperstraat reservoir

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	7,01	6,88	6,25	5,94	5,79	5,56	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	6,5	7,4	1,4	1,1	1,1	1,1	<150	150-370	7 years
Turbidity (NTU)	0,94	1,3	2,0	1,5	1,4	1,9	<1	1-5	No Limit [d]
Langelier Saturation Index	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	17	12	5	2	<1	<1	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	12,0	12,0	4,0	4,0	4,0	4,0	-	-	-
Total Hardness (as $CaCO_3$)	16,3	16,2	3,1	3,7	3,1	2,5	-	-	-
Calcium Hardness (as $CaCO_3$)	9,3	8,0	1,7	1,9	1,7	2,5	-	-	-
Calcium (as Ca)	3,7	3,2	0,66	0,77	0,66	0,99	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	7,0	8,2	1,4	1,8	1,4	<1	-	-	-
Magnesium (as Mg)	1,7	2,0	0,33	0,44	0,33	<0,30	<70	70-100	7 years
Sodium (as Na)	9,7	10,9	2,4	2,3	2,3	2,3	<200	200-400	7 years
Potassium (as K)	0,44	0,44	0,33	0,11	0,11	0,11	<50	50-100	7 years
Zinc (as Zn)	<0,01	<0,01	<0,01	0,03	0,01	<0,01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	20,6	20,6	10,3	4,1	12,4	6,2	<200	200-600	7 years
Fluoride (as F)	<0,10	0,22	0,34	0,45	0,20	0,32	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<4,0	<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years
Total Dissolved Solids	60	70	20	20	20	20	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	<10	10-20	7 years
Nitrate Nitrogen (as N)	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
Dissolved Organic Carbon (as C)	-	-	To Follow	-	-	-	<10	10-20	3 months[e]

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Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	20	80	40	100	120	260	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	20	40	20	<14	20	<14	<300	300-500	1 year
Nickel (as Ni)	-	-	<8	-	-	-	<150	150-350	1 year
Cobalt (as Co)	-	-	<7	-	-	-	<500	500-1000	1 year
Copper (as Cu)	-	-	<22	-	-	-	<1000	1000-2000	1 year
Chromium (as Cr)	-	-	<10	-	-	-	<100	100-500	3 months
Cadmium (as Cd)	-	-	<1	-	-	-	<5	5-10	6 months
Lead (as Pb)	-	-	<8	-	-	-	<20	20-50	3 months
Cyanide (as CN^-)	-	-	<50	-	-	-	<50	50-70	1 week
Arsenic (as As)	-	-	To Follow	-	-	-	<10	10-50	1 year
Mercury (as Hg)	-	-	To Follow	-	-	-	<1	1-5	3 months
Selenium (as Se)	-	-	To Follow	-	-	-	<20	20-50	1 year
Vanadium (as V)	-	-	To Follow	-	-	-	<200	200-500	1 year
Antimony (as Sb)	-	-	To Follow	-	-	-	<10	10-50	1 year
Trihalomethanes	-	-	To Follow	-	-	-	<200	200-300	10 years [f]
Phenols	-	-	To Follow	-	-	-	<10	10-70	No Limit [b]

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	19	20	21	22	23	24	Allowable Compliance Contribution [e] 95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	330	11	Nil	Nil	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : 25 Op Die Berg Final

Sample Number :	25	SANS 241 – 2006 (Drinking Water)		
		Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	5,31	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	6,3	<150	150-370	7 years
Turbidity (NTU)	0,25	<1	1-5	No Limit [d]
Langelier Saturation Index	-	-	-	-
	mg/l	mg/l	mg/l	
Colour (as Pt)	5	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	4,0	-	-	-
Total Hardness (as $CaCO_3$)	11,8	-	-	-
Calcium Hardness (as $CaCO_3$)	4,8	-	-	-
Calcium (as Ca)	1,9	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	7,0	-	-	-
Magnesium (as Mg)	1,7	<70	70-100	7 years
Sodium (as Na)	7,7	<200	200-400	7 years
Potassium (as K)	0,33	<50	50-100	7 years
Zinc (as Zn)	<0,01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	16,5	<200	200-600	7 years
Fluoride (as F)	<0,10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<400	400-600	7 years
Total Dissolved Solids	60	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	1,6	<10	10-20	7 years
Nitrate Nitrogen (as N)	1,6	-	-	-
Nitrite Nitrogen (as N)	<0,08	-	-	-
Dissolved Organic Carbon (as C)	To Follow	<10	10-20	3 months[e]

Sample Number :	**25**	**SANS 241 – 2006 (Drinking Water)**		
		Class I (Recomm. Operational Limit)	**Class II (Max. Allow. for Limited Duration)**	**Class II Water Consumption Period, [a] max.**
	µg/l	µg/l	µg/l	
Iron (as Fe)	<10	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<100	100-1 000	7 years
Aluminium (as Al)	40	<300	300-500	1 year
Nickel (as Ni)	<8	<150	150-350	1 year
Cobalt (as Co)	<7	<500	500-1000	1 year
Copper (as Cu)	28	<1000	1000-2000	1 year
Chromium (as Cr)	<10	<100	100-500	3 months
Cadmium (as Cd)	<1	<5	5-10	6 months
Lead (as Pb)	<8	<20	20-50	3 months
Cyanide (as CN^-)	<50	<50	50-70	1 week
Arsenic (as As)	To Follow	<10	10-50	1 year
Mercury (as Hg)	To Follow	<1	1-5	3 months
Selenium (as Se)	To Follow	<20	20-50	1 year
Vanadium (as V)	To Follow	<200	200-500	1 year
Antimony (as Sb)	To Follow	<10	10-50	1 year
Trihalomethanes	To Follow	<200	200-300	10 years [f]
Phenols	To Follow	<10	10-70	No Limit [b]

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2	3	4	5
Sample Number :	**25**	**Allowable Compliance Contribution [e]**		
		95% of samples, min.	**4% of samples, max.**	**1% of samples, max.**
		Upper Limits		
E.coli **[f] (count/100 ml)**	Nil	Not Detected	Not Detected	1
Total Coliform Bacteria [g] (count/100 ml)	Nil	-	-	-
Heterotrophic Plate Count [h] (count/ml)	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

……

N. VAN BINSBERGEN Pr.Sci.Nat.
DIRECTOR

148/2/2/4118
16 November 2010

TO : WITZENBERG MUNICIPALITY
P O Box 44
CERES
6835

Attention : STEPHANIE FARMER

APPENDIX 1 : Specific Methods used for the Analysis of Parameters indicated in this report.

Parameter	Method	Estimated Uncertainty (%)
pH (at 25 °C) - Lab	SABS 11 : (1990 – 3rd Revision)	0,019
pH (at 25 °C) – Field*	SABS 11 : (1990 – 3rd Revision)	-
Langelier Saturation Index (at 25 °C)*	Calculation	-
Conductivity (mS/m) (at 25 °C)	STD Method 2501 A (1992)	2,15
Turbidity (NTU)	Hach 8237	1,81
Colour (mg/l as Pt)*	Hach 8025	-
Total Alkalinity (mg/l as $CaCO_3$)*	STD Methods 2320 (1992)	-
Total Hardness (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Calcium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Magnesium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,08
Chloride (mg/l as Cl)	SABS 202 (2nd Revision)	0,08
Fluoride (mg/l as F)	Hach 8029	0,19
Iron (µg/l as Fe)	SANS 5207 (2004)	0,09
Manganese (µg/l as Mn)	SANS 5209 (2005)	0,09
Aluminium (µg/l as Al)	SANS 6169 (2005)	0,14
Calcium Carbonate Precipitation Potential*	Calculation	-
Free Chlorine (mg/l)*	Lovibond Method 3	-
Sodium (mg/l as Na)	SANS 6050 (2004)	0,08
Potassium (mg/l as K)	STD Method 3111 B (1992)	0,07
Zinc (mg/l as Zn)	SANS 5214 (2005)	0,08
Nitrate Nitrogen (mg/l as N)	Hach 8150	0,12
Nitrate Nitrogen (mg/l as N)	Lovibond Method using Brucine	0,057
Nitrite Nitrogen (mg/l as N)	Lovibond Method	0,08
Nitrate & Nitrite Nitrogen (mg/l as N)	Hach 8150	-
Ammonia (mg/l as N)	STD Method 4500-NH_3:C (1992)	0,07
Sulphate (mg/l as SO4)	Hach 8051	0,17
Total Dissolved Solids*	STD Method 2501 A (1992)	1,63
E.coli (organisms per 100 ml)	SABS 221 (2002)	-
Coliforms (organisms per 100 ml)	SABS 221 (2002)	-
Total Plate Count (organisms per ml)	Petrifilm ™	-
Faecal coliforms (organisms per 100 ml)	SABS SM 221 (2002)	-
Settleable Solids (ml/l)*	STD Method 2540 F (1992)	-
Chemical Oxygen Demand (mg/l)	SANS 6048 (2005)	0,08
Total Kjeldahl Nitrogen (mg/l)*	Hach 8075	-
Dissolved Oxygen (mg/l)*	STD Method 4500 O-G	-
Total Suspended Solids (mg/l)*	STD Method 2540 D (1992)	-
Volatile Suspended Solids (mg/l)*	STD Method 2540 E (1992)	-
Total Phosphate (mg/l as P)*	STD Method 4500-PB (1992) / Hach 8114	-
Ortho Phosphate (mg/l as P)*	Hach 8114	-
Copper (µg/l as Cu)	SANS 5203 (2005)	0,13

*** Tests marked "Not SANAS Accredited" in this report are not included in the SANAS Schedule of Accreditation for this laboratory.**

(Schedule of Accreditation excludes sampling)

A.L. ABBOTT AND ASSOCIATES (PTY) LTD

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7915
SOUTH AFRICA

Certificate of Analysis

WITZENBERG MUNICIPALITY

SAMPLE : **24 Samples of Drinking Water, marked**

1. **WBWMCR-001 : Reservoir. Final. Post-Chlorination ex Ceres**
2. **WBWMCR-002 : Wastewater Treatment Works ex Ceres (No Sample Received)**
3. **WBWMCR-003 : Nduli Intermediate School ex Ceres**
4. **WBWMCR-004 : John Steyn Library ex Ceres**
5. **WBWMCR-005 : Bella Vista Clinic ex Ceres**
6. **WBWMCR-006 : 41 Chris Hani ex Ceres**

DATE RECEIVED : **6 December 2010**

OUR REF. : **sc/148/2/2/4425** **LAB DATA SHEET NO. : 10/3315 & 3389**
14 December 2010

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	6,46	6,36	6,31	6,37	6,42	6,40	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	3,6	3,4	3,3	3,4	3,2	3,6	<150	150-370	7 years
Turbidity (NTU)	0,69	0,51	0,57	0,60	0,44	0,58	<1	1-5	No Limit [d]
Langelier Saturation Index	-3,88	-3,98	-4,03	-3,84	-3,68	-3,63	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	12	13	14	16	13	15	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	8,0	8,0	8,0	8,0	12,0	12,0	-	-	-
Total Hardness (as $CaCO_3$)	8,2	8,6	8,6	9,8	9,1	9,4	-	-	-
Calcium Hardness (as $CaCO_3$)	3,3	3,3	3,3	4,5	3,8	4,5	-	-	-
Calcium (as Ca)	1,3	1,3	1,3	1,8	1,5	1,8	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	4,9	5,3	5,3	5,3	5,3	4,9	-	-	-
Magnesium (as Mg)	1,2	1,3	1,3	1,3	1,3	1,2	<70	70-100	7 years
Sodium (as Na)	5,2	5,4	5,2	5,1	5,2	5,2	<200	200-400	7 years
Potassium (as K)	0,44	0,44	0,33	0,44	0,44	0,44	<50	50-100	7 years
Zinc (as Zn)	<0,01	<0,01	<0,01	0,02	0,02	<0,02	<5.0	5.0-10.0	1 year
Chloride (as Cl)	7,9	7,9	9,9	11,9	9,9	9,9	<200	200-600	7 years
Fluoride (as F)	<0,10	0,45	0,50	0,62	0,50	0,45	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<4,0	<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	40	40	40	40	40	40	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0,43	0,42	0,48	0,45	0,36	0,38	<10	10-20	7 years
Nitrate Nitrogen (as N)	0,43	0,42	0,48	0,45	0,36	0,38	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	40	<10	20	40	<10	40	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	20	60	30	60	<14	40	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	1	2	3	4	5	6	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	912	Nil	Nil	Nil	Nil	Nil			

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **7. WBWMOD-001 : 469 River Singel ex Op-die-Berg**
8. WBWMOD-002 : Clinic ex Op-die-Berg
9. WBWMOD-003 : Tap ex Op-die-Berg
10. WBWMPR-001 : Reservoir. Post-Chlorination ex Prince Alfred Hamlet
11. WBWMPR-002 : 266 Steve Tshewete St. Kliprug ex Prince Alfred Hamlet
12. WBWMPR-003 : Municipal Offices ex Prince Alfred Hamlet

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	5,56	5,23	5,12	5,46	6,24	6,56	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	5,9	6,1	5,5	2,9	47,8	47,9	<150	150-370	7 years
Turbidity (NTU)	0,13	0,15	0,21	0,33	0,41	1,0	<1	1-5	No Limit [d]
Langelier Saturation Index	-4,90	-5,23	-5,38	-5,22	-1,95	-1,64	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	<1	5	<1	3	6	4	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	4,0	4,0	4,0	4,0	52,0	52,0	-	-	-
Total Hardness (as $CaCO_3$)	12,7	12,3	11,8	6,6	154	148	-	-	-
Calcium Hardness (as $CaCO_3$)	5,3	5,3	4,8	3,0	102	99,5	-	-	-
Calcium (as Ca)	2,1	2,1	1,9	1,2	40,7	39,8	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	7,4	7,0	7,0	3,6	52,1	48,8	-	-	-
Magnesium (as Mg)	1,8	1,7	1,7	0,88	12,7	11,9	<70	70-100	7 years
Sodium (as Na)	7,8	7,6	7,6	5,2	45,9	44,3	<200	200-400	7 years
Potassium (as K)	0,44	0,44	0,44	0,33	0,77	0,77	<50	50-100	7 years
Zinc (as Zn)	<0,01	0,03	0,05	<0,01	0,02	0,02	<5.0	5.0-10.0	1 year
Chloride (as Cl)	11,9	11,9	15,8	11,9	103	99,0	<200	200-600	7 years
Fluoride (as F)	0,48	0,56	<0,10	<0,10	<0,10	<0,10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<4,0	<4,0	<4,0	20,0	21,0	<400	400-600	7 years

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	60	60	60	35	330	330	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	2,4	2,2	2,3	0,20	0,12	0,15	<10	10-20	7 years
Nitrate Nitrogen (as N)	2,4	2,2	2,3	0,20	0,12	0,15	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	<10	<10	<10	<10	<10	<10	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	170	188	<100	100-1 000	7 years
Aluminium (as Al)	120	160	180	<14	60	20	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	7	8	9	10	11	12	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	308	Nil	401	622	791	710	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **13 WBWMPR-004 : Tap ex Prince Alfred Hamlet**
14 WBWMTB-001 : Water Treatment Works. Final ex Tulbagh
15. WBWMTB-002 : Municipal Office ex Tulbagh
16. WBWMTB-003 : Bloekombossie Restaurant ex Tulbagh
17. WBWMTB-004 : Central Town ex Tulbagh
18. WBWMTB-005 : Clinic ex Tulbagh

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	6,82	9,54	7,82	7,73	7,64	7,59	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	47,4	15,5	8,7	9,3	8,8	8,5	<150	150-370	7 years
Turbidity (NTU)	0,61	0,81	0,94	0,74	0,65	0,84	<1	1-5	No Limit [d]
Langelier Saturation Index	-1,37	1,1	-1,72	-1,76	-2,03	-2,10	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	4	15	16	8	7	7	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	52,0	52,0	20,0	16,0	16,0	16,0	-	-	-
Total Hardness (as $CaCO_3$)	152	55,4	20,5	24,3	20,0	18,7	-	-	-
Calcium Hardness (as $CaCO_3$)	101	46,8	9,0	12,8	8,5	8,0	-	-	-
Calcium (as Ca)	40,4	18,7	3,6	5,1	3,4	3,2	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	51,3	8,6	11,5	11,5	11,5	10,7	-	-	-
Magnesium (as Mg)	12,5	2,1	2,8	2,8	2,8	2,6	<70	70-100	7 years
Sodium (as Na)	46,1	12,9	12,4	12,0	12,4	12,3	<200	200-400	7 years
Potassium (as K)	0,77	0,44	0,44	0,55	0,44	0,44	<50	50-100	7 years
Zinc (as Zn)	0,04	<0,01	<0,01	<0,01	0,02	0,02	<5.0	5.0-10.0	1 year
Chloride (as Cl)	79,2	23,8	19,8	19,8	19,8	21,8	<200	200-600	7 years
Fluoride (as F)	<0,10	<0,10	<0,10	<0,10	0,46	<0,10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	24,0	<4,0	<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	330	120	80	90	80	80	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0,17	<0,05	<0,05	0,10	<0,05	<0,05	<10	10-20	7 years
Nitrate Nitrogen (as N)	0,17	<0,05	<0,05	0,1	<0,05	<0,05	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	20	60	<10	20	<10	40	<200	200-2 000	7 years [b]
Manganese (as Mn)	176	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	60	60	60	80	60	40	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	13	14	15	16	17	18	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	410	479	Nil	742	245	1	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **19 WBWMTB-006 : Wastewater Treatment Works Tap ex Tulbagh**
20 WBWMTB-007 : Shell Garage. Main Road ex Tulbagh
21 WBWMWO-001 : Water Treatment Works. Final ex Wolseley
22 WBWMWO-002 : No. 4. NPK. Pine Valley ex Wolseley
23 WBWMWO-003 : Municipal Office ex Wolseley
24 WBWMWO-004 : stamperstraat reservoir

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	7,48	7,50	7,49	6,19	6,13	5,84	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	9,1	8,7	1,4	1,4	1,4	2,0	<150	150-370	7 years
Turbidity (NTU)	0,68	1,1	0,45	0,28	0,23	0,22	<1	1-5	No Limit [d]
Langelier Saturation Index	-1,92	-2,07	-2,97	-4,67	-4,67	-4,97	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	14	13	8	7	2	6	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	20,0	20,0	4,0	4,0	4,0	4,0	-	-	-
Total Hardness (as $CaCO_3$)	23,2	19,2	6,6	3,3	3,6	3,6	-	-	-
Calcium Hardness (as $CaCO_3$)	12,5	8,5	4,8	1,9	2,2	2,2	-	-	-
Calcium (as Ca)	5,0	3,4	1,9	0,77	0,88	0,88	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	10,7	10,7	1,8	1,4	1,4	1,4	-	-	-
Magnesium (as Mg)	2,6	2,6	0,44	0,33	0,33	0,33	<70	70-100	7 years
Sodium (as Na)	12,2	12,8	2,5	2,4	2,5	2,4	<200	200-400	7 years
Potassium (as K)	0,44	0,55	<0,09	0,11	<0,09	<0,09	<50	50-100	7 years
Zinc (as Zn)	0,02	0,02	0,04	0,05	0,03	0,07	<5.0	5.0-10.0	1 year
Chloride (as Cl)	23,8	15,8	7,9	5,9	5,9	5,9	<200	200-600	7 years
Fluoride (as F)	<0,10	0,40	<0,10	<0,10	<0,10	<0,10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<4,0	<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	90	80	20	20	20	30	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0,08	0,06	<0,05	<0,05	<0,05	<0,05	<10	10-20	7 years
Nitrate Nitrogen (as N)	0,08	0,06	<0,05	<0,05	<0,05	<0,05	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	20	40	<10	<10	<10	<10	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	80	40	40	40	<14	20	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
							Allowable Compliance Contribution [e]		
Sample Number :	19	20	21	22	23	24	95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] (count/100 ml)	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] (count/100 ml)	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] (count/ml)	Nil	42	821	791	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

……

R. VAN DER MEULEN Pr.Sci.Nat.
DIRECTOR

148/2/2/4425
14 December 2010

TO : WITZENBERG MUNICIPALITY
P O Box 44
CERES
6835

Attention : STEPHANIE FARMER

APPENDIX 1 : Specific Methods used for the Analysis of Parameters indicated in this report.

Parameter	Method	Estimated Uncertainty (%)
pH (at 25 °C) - Lab	SABS 11 : (1990 – 3rd Revision)	0,019
pH (at 25 °C) – Field*	SABS 11 : (1990 – 3rd Revision)	-
Langelier Saturation Index (at 25 °C)*	Calculation	-
Conductivity (mS/m) (at 25 °C)	STD Method 2501 A (1992)	2,15
Turbidity (NTU)	Hach 8237	1,81
Colour (mg/l as Pt)*	Hach 8025	-
Total Alkalinity (mg/l as $CaCO_3$)*	STD Methods 2320 (1992)	-
Total Hardness (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Calcium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Magnesium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,08
Chloride (mg/l as Cl)	SABS 202 (2nd Revision)	0,08
Fluoride (mg/l as F)	Hach 8029	0,19
Iron (µg/l as Fe)	SANS 5207 (2004)	0,09
Manganese (µg/l as Mn)	SANS 5209 (2005)	0,09
Aluminium (µg/l as Al)	SANS 6169 (2005)	0,14
Calcium Carbonate Precipitation Potential*	Calculation	-
Free Chlorine (mg/l)*	Lovibond Method 3	-
Sodium (mg/l as Na)	SANS 6050 (2004)	0,08
Potassium (mg/l as K)	STD Method 3111 B (1992)	0,07
Zinc (mg/l as Zn)	SANS 5214 (2005)	0,08
Nitrate Nitrogen (mg/l as N)	Hach 8150	0,12
Nitrate Nitrogen (mg/l as N)	Lovibond Method using Brucine	0,057
Nitrite Nitrogen (mg/l as N)	Lovibond Method	0,08
Nitrate & Nitrite Nitrogen (mg/l as N)	Hach 8150	-
Ammonia (mg/l as N)	STD Method 4500-NH_3:C (1992)	0,07
Sulphate (mg/l as SO4)	Hach 8051	0,17
Total Dissolved Solids*	STD Method 2501 A (1992)	1,63
E.coli (organisms per 100 ml)	SABS 221 (2002)	-
Coliforms (organisms per 100 ml)	SABS 221 (2002)	-
Total Plate Count (organisms per ml)	Petrifilm ™	-
Faecal coliforms (organisms per 100 ml)	SABS SM 221 (2002)	-
Settleable Solids (ml/l)*	STD Method 2540 F (1992)	-
Chemical Oxygen Demand (mg/l)	SANS 6048 (2005)	0,08
Total Kjeldahl Nitrogen (mg/l)*	Hach 8075	-
Dissolved Oxygen (mg/l)*	STD Method 4500 O-G	-
Total Suspended Solids (mg/l)*	STD Method 2540 D (1992)	-
Volatile Suspended Solids (mg/l)*	STD Method 2540 E (1992)	-
Total Phosphate (mg/l as P)*	STD Method 4500-PB (1992) / Hach 8114	-
Ortho Phosphate (mg/l as P)*	Hach 8114	-
Copper (µg/l as Cu)	SANS 5203 (2005)	0,13

*** Tests marked "Not SANAS Accredited" in this report are not included in the SANAS Schedule of Accreditation for this laboratory.**

(Schedule of Accreditation excludes sampling)

A.L. ABBOTT AND ASSOCIATES (PTY) LTD

(Reg. No. 1982/004379/07)

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SOUTH AFRICA

DRINKING WATER SAMPLES

SAMPLE : 24 Samples of Water, marked

1. WBWMCR-001 : Reservoir. Final. Post-Chlorination ex Ceres
2. WBWMCR-002 : Wastewater Treatment Works ex Ceres
3. WBWMCR-003 : Nduli Intermediate School ex Ceres
4. WBWMCR-004 : John Steyn Library ex Ceres
5. WBWMCR-005 : Bella Vista Clinic ex Ceres
6. WBWMCR-006 : 41 Chris Hani ex Ceres

DATE RECEIVED : 4 February 2010

OUR REF. : cc/sc/148/2/2/499 **LAB DATA SHEET NO. : 10/259**

16 February 2010

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	7.30	7.29	7.30	7.19	7.18	7.00	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	3.8	4.6	4.6	4.0	3.8	3.7	<150	150-370	7 years
Turbidity (NTU)	0.99	0.84	0.94	0.80	0.71	0.98	<1	1-5	No Limit [d]
Langelier Saturation Index	-3.05	-2.41	-2.43	-2.99	-3.05	-3.34	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	17	16	16	14	16	18	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-9.0	-7.5	-12.8	-8.8	-9.0	-10.1	-	-	-
Total Alkalinity (as $CaCO_3$)	8.0	12.0	12.0	8.0	8.0	8.0	-	-	-
Total Hardness (as $CaCO_3$)	5.6	12.1	11.6	7.1	7.0	6.5	-	-	-
Calcium Hardness (as $CaCO_3$)	3.3	9.8	9.3	4.8	4.3	3.3	-	-	-
Calcium (as Ca)	1.3	3.9	3.7	1.9	1.7	1.3	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	2.3	2.3	2.3	2.3	2.7	3.2	-	-	-
Magnesium (as Mg)	0.55	0.55	0.55	0.55	0.66	0.77	<70	70-100	7 years
Sodium (as Na)	5.9	5.6	5.6	5.7	5.7	5.6	<200	200-400	7 years
Potassium (as K)	0.33	0.33	0.33	0.33	0.33	0.33	<50	50-100	7 years
Zinc (as Zn)	<0.01	0.02	0.01	0.03	0.03	0.04	<5.0	5.0-10.0	1 year
Chloride (as Cl)	5.6	5.6	3.7	5.6	5.6	3.7	<200	200-600	7 years
Fluoride (as F)	0.11	<0.1	0.17	<0.1	0.14	0.20	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<400	400-600	7 years

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	30	40	40	30	30	30	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0.45	0.44	0.25	0.42	0.49	0.48	<10	10-20	7 years
Nitrate Nitrogen (as N)	0.45	0.44	0.25	0.42	0.49	0.48	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	80	220	140	<10	240	270	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	<14	<14	100	120	140	120	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	1	2	3	4	5	6	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	4	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	33	1470	1045	1	Nil	3	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **7. WBWMOD-001 : 469 River Singel ex Op-die-Berg**
8. WBWMOD-002 : Clinic ex Op-die-Berg
9. WBWMOD-003 : Tap ex Op-die-Berg
10. WBWMPR-001 : Reservoir. Post-Chlorination ex Prince Alfred Hamlet
11. WBWMPR-002 : 266 Steve Tshewete St. Kliprug ex Prince Alfred Hamlet
12. WBWMPR-003 : Municipal Offices ex Prince Alfred Hamlet

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	5.18	5.27	4.91	6.13	6.21	6.29	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	6.0	6.1	6.3	42.6	43.1	44.1	<150	150-370	7 years
Turbidity (NTU)	0.22	0.17	0.25	1.2	1.3	0.68	<1	1-5	No Limit [d]
Odour (Threshold Odour Number)	-	-	-	-	-	-	<5	5-10	No Limit [b]
Langelier Saturation Index	-5.35	-5.11	UDF	-2.33	-2.30	-2.10	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	<1	<1	<1	<1	<1	<1	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-123	-102	-39.8	-101	-78.0	-79.1	-	-	-
Total Alkalinity (as $CaCO_3$)	4.0	4.0	<1.0	36.0	32.0	40.0	-	-	-
Total Hardness (as $CaCO_3$)	9.4	10.4	8.9	120	121	126	-	-	-
Calcium Hardness (as $CaCO_3$)	4.5	6.3	4.8	77.0	77.3	81.5	-	-	-
Calcium (as Ca)	1.8	2.5	1.9	30.8	30.9	32.6	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	4.9	4.1	4.1	43.1	43.5	44.7	-	-	-
Magnesium (as Mg)	1.2	0.99	0.99	10.5	10.6	10.9	<70	70-100	7 years
Sodium (as Na)	7.6	7.6	7.6	35.2	35.3	37.1	<200	200-400	7 years
Potassium (as K)	0.33	0.44	0.44	0.88	0.88	0.99	<50	50-100	7 years
Zinc (as Zn)	0.02	0.03	0.01	0.04	0.03	0.02	<5.0	5.0-10.0	1 year
Chloride (as Cl)	3.7	7.5	7.5	82.2	84.1	89.7	<200	200-600	7 years
Fluoride (as F)	0.31	0.10	0.34	0.27	0.36	0.37	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4.0	<4.0	<4.0	21.0	24.0	28.0	<400	400-600	7 years

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	40	40	45	290	290	290	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	1.5	1.8	1.7	<0.05	<0.05	<0.05	<10	10-20	7 years
Nitrate Nitrogen (as N)	1.5	1.8	1.7	<0.05	<0.05	<0.05	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	<10	80	160	340	440	200	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	220	220	184	<100	100-1 000	7 years
Aluminium (as Al)	200	180	220	60	40	100	<300	300-500	1 year

a	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
b	The limits given are based on aesthetic aspects.
c	No primary health effect – low pH values can result in structural problems in the distribution system.
d	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	7	8	9	10	11	12	Allowable Compliance Contribution [e] 95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	1260	714	1008	Nil	Nil	Nil	-	-	-

e	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
f	Definitive preferred indicator of faecal pollution.
g	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
h	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **13 WBWMPR-004 : Tap ex Prince Alfred Hamlet**
14 WBWMTB-001 : Water Treatment Works. Final ex Tulbagh
15. WBWMTB-002 : Municipal Office ex Tulbagh
16. WBWMTB-003 : Bloekombossie Restaurant ex Tulbagh
17. WBWMTB-004 : Central Town ex Tulbagh
18. WBWMTB-005 : Clinic ex Tulbagh

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	6.32	9.99	7.76	7.67	7.62	7.54	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	46.3	20.6	10.6	10.5	10.5	10.2	<150	150-370	7 years
Turbidity (NTU)	0.72	4.6	6.4	6.0	5.7	5.9	<1	1-5	No Limit [d]
Odour (Threshold Odour Number)	-	-	-	-	-	-	<5	5-10	No Limit [b]
Langelier Saturation Index	-2.06	1.6	-1.64	-1.73	-1.76	-1.91	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	2	11	19	20	21	20	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-74.1	33.4	-5.8	-6.1	-6.2	-6.9	-	-	-
Total Alkalinity (as $CaCO_3$)	40.0	56.0	20.0	20.0	20.0	20.0	-	-	-
Total Hardness (as $CaCO_3$)	129	60.9	22.2	21.8	23.8	21.6	-	-	-
Calcium Hardness (as $CaCO_3$)	84.0	56.8	12.8	12.8	13.5	11.3	-	-	-
Calcium (as Ca)	33.6	22.7	5.1	5.1	5.4	4.5	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	44.7	4.1	9.4	9.0	10.3	10.3	-	-	-
Magnesium (as Mg)	10.9	0.99	2.3	2.2	2.5	2.5	<70	70-100	7 years
Sodium (as Na)	38.8	13.0	13.2	13.4	13.4	13.1	<200	200-400	7 years
Potassium (as K)	0.99	0.66	0.77	0.77	0.77	0.77	<50	50-100	7 years
Zinc (as Zn)	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	89.7	20.6	16.8	20.6	18.7	18.7	<200	200-600	7 years
Fluoride (as F)	0.25	0.17	0.19	0.23	0.39	0.40	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	25.0	<4.0	<4.0	<4.0	<4.0	<4.0	<400	400-600	7 years

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	310	140	80	80	80	80	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	<0.15	<0.15	<0.15	<0.15	0.15	<0.15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	<0.05	<0.05	0.23	0.26	<0.05	0.26	<10	10-20	7 years
Nitrate Nitrogen (as N)	<0.05	<0.05	0.23	0.26	<0.05	0.26	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	120	280	400	650	260	320	<200	200-2 000	7 years [b]
Manganese (as Mn)	220	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	100	400	420	300	320	460	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	13	14	15	16	17	18	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	8	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	1	966	Nil	Nil	2	1	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **19 WBWMTB-006 : Wastewater Treatment Works Tap ex Tulbagh**
20 WBWMTB-007 : Shell Garage. Main Road ex Tulbagh
21 WBWMWO-001 : Water Treatment Works. Final ex Wolseley
22 WBWMWO-002 : No. 4. NPK. Pine Valley ex Wolseley
23 WBWMWO-003 : Municipal Office ex Wolseley
24 WBWMWO-004 : stamperstraat reservoir

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	7.52	7.42	6.02	5.91	5.85	5.69	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	10.6	10.0	1.7	1.7	1.7	1.7	<150	150-370	7 years
Turbidity (NTU)	6.0	6.8	0.53	0.33	0.39	0.33	<1	1-5	No Limit [d]
Langelier Saturation Index	-1.99	-2.03	-5.08	-5.09	-5.15	-5.22	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	21	18	7	3	4	1	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-6.6	-7.6	-21.8	-26.7	-30.0	-41.6	-	-	-
Total Alkalinity (as $CaCO_3$)	16.0	20.0	4.0	4.0	4.0	4.0	-	-	-
Total Hardness (as $CaCO_3$)	22.8	21.1	<2.0	<2.0	<2.0	<2.0	-	-	-
Calcium Hardness (as $CaCO_3$)	12.5	11.3	1.1	1.4	1.4	1.7	-	-	-
Calcium (as Ca)	5.0	4.5	0.44	0.55	0.55	0.66	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	10.3	9.8	<1.0	<1.0	<1.0	<1.0	-	-	-
Magnesium (as Mg)	2.5	2.4	<0.3	<0.3	<0.3	<0.3	<70	70-100	7 years
Sodium (as Na)	13.3	12.2	3.1	3.1	3.1	3.1	<200	200-400	7 years
Potassium (as K)	0.77	0.77	<0.09	<0.09	<0.09	<0.09	<50	50-100	7 years
Zinc (as Zn)	<0.01	<0.01	<0.01	0.02	0.02	0.04	<5.0	5.0-10.0	1 year
Chloride (as Cl)	18.7	15.0	3.7	1.9	3.7	1.9	<200	200-600	7 years
Fluoride (as F)	0.43	0.26	0.20	0.40	<0.1	0.22	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<400	400-600	7 years

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	80	70	15	15	15	15	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0.23	<0.05	0.53	<0.05	<0.05	<0.05	<10	10-20	7 years
Nitrate Nitrogen (as N)	0.23	<0.05	0.53	<0.05	<0.05	<0.05	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	270	260	120	<10	40	<10	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	360	380	60	100	40	100	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	19	20	21	22	23	24	Allowable Compliance Contribution [e] 95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] (count/100 ml)	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] (count/100 ml)	Nil	20	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] (count/ml)	1	53	Nil	Nil	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

.....
T.R. DAVIES Pr.Sci.Nat.
Chartered Water & Environmental Manager
DIRECTOR

148/2/2/499
16 February 2010

TO : WITZENBERG MUNICIPALITY
P O Box 44
CERES
6835

Attention : MR JOHAN SWANEPOEL

APPENDIX 1 : Specific Methods used for the Analysis of Parameters indicated in this report.

Parameter	Method	Estimated Uncertainty (%)
pH (at 25°C) - Lab	SABS 11 : (1990 – 3rd Revision)	0,019
pH (at 25°C) – Field*	SABS 11 : (1990 – 3rd Revision)	-
Langelier Saturation Index (at 25°C)*	Calculation	-
Conductivity (mS/m) (at 25°C)	STD Method 2501 A (1992)	2,15
Turbidity (NTU)	Hach 8237	1,81
Colour (mg/l as Pt)*	Hach 8025	-
Total Alkalinity (mg/l as $CaCO_3$)*	STD Methods 2320 (1992)	-
Total Hardness (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Calcium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Magnesium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,08
Chloride (mg/l as Cl)	SABS 202 (2nd Revision)	0,08
Fluoride (mg/l as F)	Hach 8029	0,19
Iron (µg/l as Fe)	SANS 5207 (2004)	0,09
Manganese (µg/l as Mn)	SANS 5209 (2005)	0,09
Aluminium (µg/l as Al)	SANS 6169 (2005)	0,14
Calcium Carbonate Precipitation Potential*	Calculation	-
Free Chlorine (mg/l)*	Lovibond Method 3	-
Sodium (mg/l as Na)	SANS 6050 (2004)	0,08
Potassium (mg/l as K)	STD Method 3111 B (1992)	0,07
Zinc (mg/l as Zn)	SANS 5214 (2005)	0,08
Nitrate Nitrogen (mg/l as N)	Hach 8150	0,12
Nitrate Nitrogen (mg/l as N)	Lovibond Method using Brucine	0,057
Nitrite Nitrogen (mg/l as N)	Lovibond Method	0,08
Nitrate & Nitrite Nitrogen (mg/l as N)	Hach 8150	-
Ammonia (mg/l as N)	STD Method 4500-NH_3:C (1992)	0,07
Sulphate (mg/l as SO4)	Hach 8051	0,17
Total Dissolved Solids*	STD Method 2501 A (1992)	1,63
E.coli (organisms per 100 ml)*	SABS 221 (2002)	-
Coliforms (organisms per 100 ml)*	SABS 221 (2002)	-
Total Plate Count (organisms per ml)*	Petrifilm ™	-
Faecal coliforms (organisms per 100 ml)*	SABS SM 221 (2002)	-
Settleable Solids (ml/l)*	STD Method 2540 F (1992)	-
Chemical Oxygen Demand (mg/l)	SANS 6048 (2005)	0,08
Total Kjeldahl Nitrogen (mg/l)*	Hach 8075	-
Dissolved Oxygen (mg/l)*	STD Method 4500 O-G	-
Total Suspended Solids (mg/l)*	STD Method 2540 D (1992)	-
Volatile Suspended Solids (mg/l)*	STD Method 2540 E (1992)	-
Total Phosphate (mg/l as P)*	STD Method 4500-PB (1992) / Hach 8114	-
Ortho Phosphate (mg/l as P)*	Hach 8114	-
Copper (µg/l as Cu)	SANS 5203 (2005)	0,13

*** Tests marked "Not SANAS Accredited" in this report are not included in the SANAS Schedule of Accreditation for this laboratory.**

(Schedule of Accreditation excludes sampling)

A.L. ABBOTT AND ASSOCIATES (PTY) LTD

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WOODSTOCK, CAPE
7915
SOUTH AFRICA

WITZENBERG MUNICIPALITY

SAMPLE : 23 Samples of Water, marked

1. WBWMCR-001 : Reservoir. Final. Post-Chlorination ex Ceres
2. No sample received
3. WBWMCR-003 : Nduli Intermediate School ex Ceres
4. WBWMCR-004 : John Steyn Library ex Ceres
5. WBWMCR-005 : Bella Vista Clinic ex Ceres
6. WBWMCR-006 : 41 Chris Hani ex Ceres

DATE RECEIVED : 5 March 2010

OUR REF. : cc/sc/148/2/2/779 **LAB DATA SHEET NO. : 10/530**

10 March 2010

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	6.20	-	6.00	6.14	6.16	5.94	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	4.0	-	4.0	4.4	4.0	4.0	<150	150-370	7 years
Turbidity (NTU)	1.1	-	1.1	1.1	1.2	1.0	<1	1-5	No Limit [d]
Langelier Saturation Index	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	11	-	15	15	6	12	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-	-	-	-	-	-	-	-	-
Total Alkalinity (as $CaCO_3$)	8.0	-	8.0	8.0	8.0	8.0	-	-	-
Total Hardness (as $CaCO_3$)	9.2	-	9.2	12.7	9.7	9.2	-	-	-
Calcium Hardness (as $CaCO_3$)	3.5	-	3.5	7.0	4.8	4.3	-	-	-
Calcium (as Ca)	1.4	-	1.4	2.8	1.9	1.7	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	5.7	-	5.7	5.7	4.9	4.9	-	-	-
Magnesium (as Mg)	1.4	-	1.4	1.4	1.2	1.2	<70	70-100	7 years
Sodium (as Na)	5.3	-	5.3	5.3	5.3	5.3	<200	200-400	7 years
Potassium (as K)	0.33	-	0.22	0.22	0.22	0.22	<50	50-100	7 years
Zinc (as Zn)	0.24	-	0.04	0.03	0.04	0.06	<5.0	5.0-10.0	1 year
Chloride (as Cl)	9.8	-	5.9	7.8	5.9	3.9	<200	200-600	7 years
Fluoride (as F)	<0.10	-	0.22	0.27	<0.10	<0.10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4.0	-	<4.0	<4.0	<4.0	<4.0	<400	400-600	7 years

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	30	-	30	30	30	30	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	0.39	-	<0.15	0.50	0.40	0.50	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0.23	-	0.21	0.21	<0.05	<0.05	<10	10-20	7 years
Nitrate Nitrogen (as N)	0.23	-	0.21	0.21	<0.05	<0.05	-	-	-
Nitrite Nitrogen (as N)	<0.08	-	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	140	-	196	240	180	120	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	-	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	60	-	56	40	50	36	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	1	2	3	4	5	6	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	-	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	-	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	Nil	-	Nil	Nil	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **7. WBWMOD-001 : 469 River Singel ex Op-die-Berg**
8. WBWMOD-002 : Clinic ex Op-die-Berg
9. WBWMOD-003 : Tap ex Op-die-Berg
10. WBWMPR-001 : Reservoir. Post-Chlorination ex Prince Alfred Hamlet
11. WBWMPR-002 : 266 Steve Tshewete St. Kliprug ex Prince Alfred Hamlet
12. WBWMPR-003 : Municipal Offices ex Prince Alfred Hamlet

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	4.94	4.79	4.71	6.32	6.36	6.29	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	5.9	5.7	6.0	113	46.4	35.4	<150	150-370	7 years
Turbidity (NTU)	0.25	0.35	0.25	5.2	0.92	0.80	<1	1-5	No Limit [d]
Odour (Threshold Odour Number)	-	-	-	-	-	-	<5	5-10	No Limit [b]
Langelier Saturation Index	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	<1	<1	<1	<1	<1	<1	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-	-	-	-	-	-	-	-	-
Total Alkalinity (as $CaCO_3$)	<1.0	<1.0	<1.0	88.0	36.0	28.0	-	-	-
Total Hardness (as $CaCO_3$)	10.0	10.0	10.2	367	138	106	-	-	-
Calcium Hardness (as $CaCO_3$)	4.3	4.3	4.5	238	89.8	68.3	-	-	-
Calcium (as Ca)	1.7	1.7	1.8	95.2	35.9	27.3	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	5.7	5.7	5.7	129	48.0	37.3	-	-	-
Magnesium (as Mg)	1.4	1.4	1.4	31.4	11.7	9.1	<70	70-100	7 years
Sodium (as Na)	6.9	6.8	6.9	104	39.5	30.0	<200	200-400	7 years
Potassium (as K)	0.22	0.22	0.22	1.5	0.66	0.66	<50	50-100	7 years
Zinc (as Zn)	0.04	0.12	0.03	0.07	0.05	0.05	<5.0	5.0-10.0	1 year
Chloride (as Cl)	5.9	7.8	5.9	237	96.1	72.5	<200	200-600	7 years
Fluoride (as F)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4.0	<4.0	<4.0	80.0	25.0	16.0	<400	400-600	7 years

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	40	40	40	750	310	240	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	0.15	<0.15	0.29	0.45	0.37	0.20	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	1.3	1.3	1.3	<0.05	<0.05	<0.05	<10	10-20	7 years
Nitrate Nitrogen (as N)	1.3	1.3	1.3	<0.05	<0.05	<0.05	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	60	80	40	674	196	200	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	692	226	134	<100	100-1 000	7 years
Aluminium (as Al)	160	196	196	38	36	40	<300	300-500	1 year

a	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
b	The limits given are based on aesthetic aspects.
c	No primary health effect – low pH values can result in structural problems in the distribution system.
d	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	7	8	9	10	11	12	Allowable Compliance Contribution [e] 95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	2	14	Nil	Nil	Nil	4	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	1276	Nil	Nil	484	184	112	-	-	-

e	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
f	Definitive preferred indicator of faecal pollution.
g	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
h	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **13 WBWMPR-004 : Tap ex Prince Alfred Hamlet**
14 WBWMTB-001 : Water Treatment Works. Final ex Tulbagh
15. WBWMTB-002 : Municipal Office ex Tulbagh
16. WBWMTB-003 : Bloekombossie Restaurant ex Tulbagh
17. WBWMTB-004 : Central Town ex Tulbagh
18. WBWMTB-005 : Clinic ex Tulbagh

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	6.41	9.97	7.47	10.14	7.61	7.26	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	45.8	22.3	10.3	24.2	10.0	9.8	<150	150-370	7 years
Turbidity (NTU)	0.95	1.8	5.0	1.8	6.2	2.9	<1	1-5	No Limit [d]
Odour (Threshold Odour Number)	-	-	-	-	-	-	<5	5-10	No Limit [b]
Langelier Saturation Index	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	<1	<1	4	1	<1	<1	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-	-	-	-	-	-	-	-	-
Total Alkalinity (as $CaCO_3$)	36.0	60.0	16.0	64.0	16.0	16.0	-	-	-
Total Hardness (as $CaCO_3$)	139	66.0	24.4	78.8	22.3	22.3	-	-	-
Calcium Hardness (as $CaCO_3$)	89.0	63.3	12.5	76.5	12.0	10.8	-	-	-
Calcium (as Ca)	35.6	25.3	5.0	30.6	4.8	4.3	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	50.4	2.7	11.9	2.3	10.3	11.5	-	-	-
Magnesium (as Mg)	12.3	0.66	2.9	0.55	2.5	2.8	<70	70-100	7 years
Sodium (as Na)	39.1	12.4	13.0	12.7	12.9	12.7	<200	200-400	7 years
Potassium (as K)	0.66	0.44	0.44	0.44	0.44	0.44	<50	50-100	7 years
Zinc (as Zn)	0.06	0.03	0.03	0.02	0.03	0.03	<5.0	5.0-10.0	1 year
Chloride (as Cl)	92.2	58.8	19.6	21.6	19.6	17.6	<200	200-600	7 years
Fluoride (as F)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	23.0	<4.0	<4.0	<4.0	<4.0	<4.0	<400	400-600	7 years

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	310	160	80	170	70	70	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	0.17	0.18	0.46	0.23	0.23	0.20	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	10-20	7 years
Nitrate Nitrogen (as N)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	260	220	440	300	360	256	<200	200-2 000	7 years [b]
Manganese (as Mn)	220	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	<14	40	140	60	150	126	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	13	14	15	16	17	18	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **19 WBWMTB-006 : Wastewater Treatment Works Tap ex Tulbagh**
20 WBWMTB-007 : Shell Garage. Main Road ex Tulbagh
21 WBWMWO-001 : Water Treatment Works. Final ex Wolseley
22 WBWMWO-002 : No. 4. NPK. Pine Valley ex Wolseley
23 WBWMWO-003 : Municipal Office ex Wolseley
24 WBWMWO-004 : stamperstraat reservoir

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	7.23	7.10	5.61	5.57	5.49	5.55	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	10.5	10.3	2.0	1.9	1.9	1.9	<150	150-370	7 years
Turbidity (NTU)	2.1	5.9	0.55	0.39	0.32	0.37	<1	1-5	No Limit [d]
Langelier Saturation Index	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	<1	2	<1	<1	<1	<1	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-	-	-	-	-	-	-	-	-
Total Alkalinity (as $CaCO_3$)	16.0	12.0	4.0	4.0	4.0	4.0	-	-	-
Total Hardness (as $CaCO_3$)	23.8	24.7	3.7	3.1	3.1	3.1	-	-	-
Calcium Hardness (as $CaCO_3$)	11.5	12.8	1.9	2.2	2.2	2.2	-	-	-
Calcium (as Ca)	4.6	5.1	0.77	0.88	0.88	0.88	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	12.3	11.9	1.8	<1	<1	<1	-	-	-
Magnesium (as Mg)	3.0	2.9	0.44	<0.30	<0.30	<0.30	<70	70-100	7 years
Sodium (as Na)	14.0	13.1	2.6	2.6	2.6	2.6	<200	200-400	7 years
Potassium (as K)	0.44	0.44	<0.09	<0.09	<0.09	<0.09	<50	50-100	7 years
Zinc (as Zn)	0.04	0.03	0.02	0.03	0.03	0.04	<5.0	5.0-10.0	1 year
Chloride (as Cl)	19.6	17.6	<1.0	2.0	2.0	2.0	<200	200-600	7 years
Fluoride (as F)	<0.10	<0.10	0.22	0.18	0.17	0.18	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<400	400-600	7 years

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	80	80	15	15	15	15	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	0.27	0.29	0.18	0.42	0.44	0.35	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	10-20	7 years
Nitrate Nitrogen (as N)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	420	520	540	380	230	220	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	160	198	60	32	40	60	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	19	20	21	22	23	24	Allowable Compliance Contribution [e] 95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] (count/100 ml)	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] (count/100 ml)	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] (count/ml)	126	Nil	1	Nil	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

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T.R. DAVIES Pr.Sci.Nat.
Chartered Water & Environmental Manager
DIRECTOR

148/2/2/779
10 March 2010

TO : WITZENBERG MUNICIPALITY
P O Box 44
CERES
6835

Attention : MR JOHAN SWANEPOEL

APPENDIX 1 : Specific Methods used for the Analysis of Parameters indicated in this report.

Parameter	Method	Estimated Uncertainty (%)
pH (at 25 ℃) - Lab	SABS 11 : (1990 – 3rd Revision)	0,019
pH (at 25 ℃) – Field*	SABS 11 : (1990 – 3rd Revision)	-
Langelier Saturation Index (at 25 ℃)*	Calculation	-
Conductivity (mS/m) (at 25 ℃)	STD Method 2501 A (1992)	2,15
Turbidity (NTU)	Hach 8237	1,81
Colour (mg/l as Pt)*	Hach 8025	-
Total Alkalinity (mg/l as $CaCO_3$)*	STD Methods 2320 (1992)	-
Total Hardness (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Calcium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Magnesium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,08
Chloride (mg/l as Cl)	SABS 202 (2nd Revision)	0,08
Fluoride (mg/l as F)	Hach 8029	0,19
Iron (µg/l as Fe)	SANS 5207 (2004)	0,09
Manganese (µg/l as Mn)	SANS 5209 (2005)	0,09
Aluminium (µg/l as Al)	SANS 6169 (2005)	0,14
Calcium Carbonate Precipitation Potential*	Calculation	-
Free Chlorine (mg/l)*	Lovibond Method 3	-
Sodium (mg/l as Na)	SANS 6050 (2004)	0,08
Potassium (mg/l as K)	STD Method 3111 B (1992)	0,07
Zinc (mg/l as Zn)	SANS 5214 (2005)	0,08
Nitrate Nitrogen (mg/l as N)	Hach 8150	0,12
Nitrate Nitrogen (mg/l as N)	Lovibond Method using Brucine	0,057
Nitrite Nitrogen (mg/l as N)	Lovibond Method	0,08
Nitrate & Nitrite Nitrogen (mg/l as N)	Hach 8150	-
Ammonia (mg/l as N)	STD Method 4500-NH_3:C (1992)	0,07
Sulphate (mg/l as SO4)	Hach 8051	0,17
Total Dissolved Solids*	STD Method 2501 A (1992)	1,63
E.coli (organisms per 100 ml)*	SABS 221 (2002)	-
Coliforms (organisms per 100 ml)*	SABS 221 (2002)	-
Total Plate Count (organisms per ml)*	Petrifilm ™	-
Faecal coliforms (organisms per 100 ml)*	SABS SM 221 (2002)	-
Settleable Solids (ml/l)*	STD Method 2540 F (1992)	-
Chemical Oxygen Demand (mg/l)	SANS 6048 (2005)	0,08
Total Kjeldahl Nitrogen (mg/l)*	Hach 8075	-
Dissolved Oxygen (mg/l)*	STD Method 4500 O-G	-
Total Suspended Solids (mg/l)*	STD Method 2540 D (1992)	-
Volatile Suspended Solids (mg/l)*	STD Method 2540 E (1992)	-
Total Phosphate (mg/l as P)*	STD Method 4500-PB (1992) / Hach 8114	-
Ortho Phosphate (mg/l as P)*	Hach 8114	-
Copper (µg/l as Cu)	SANS 5203 (2005)	0,13

*** Tests marked "Not SANAS Accredited" in this report are not included in the SANAS Schedule of Accreditation for this laboratory.**

A.L. ABBOTT AND ASSOCIATES (PTY) LTD

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SOUTH AFRICA

WITZENBERG MUNICIPALITY

SAMPLE : 24 Samples of Water, marked

1. WBWMCR-001 : Reservoir. Final. Post-Chlorination ex Ceres
2. WBWMCR-002 : Wastewater Treatment Works ex Ceres
3. WBWMCR-003 : Nduli Intermediate School ex Ceres
4. WBWMCR-004 : John Steyn Library ex Ceres
5. WBWMCR-005 : Bella Vista Clinic ex Ceres
6. WBWMCR-006 : 41 Chris Hani ex Ceres

DATE RECEIVED : 6 April 2010

OUR REF. : cc/sc/148/2/2/1138 **LAB DATA SHEET NO. : 10/790**
12 April 2010

Sample Marked :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	5.51	5.64	5.21	6.01	5.27	4.79	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	4.0	4.5	4.0	4.1	4.0	4.0	<150	150-370	7 years
Turbidity (NTU)	1.2	1.2	1.1	1.2	0.94	1.1	<1	1-5	No Limit [d]
Langelier Saturation Index	-4.84	-4.42	-5.18	-3.92	-5.15	UDF	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	10	11	10	9	9	8	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-110	-	-	-	-	-	-	-	-
Total Alkalinity (as $CaCO_3$)	8.0	8.0	8.0	12.0	8.0	<1.0	-	-	-
Total Hardness (as $CaCO_3$)	7.8	11.4	7.9	10.3	7.7	8.3	-	-	-
Calcium Hardness (as $CaCO_3$)	3.3	6.5	3.0	5.8	2.8	3.0	-	-	-
Calcium (as Ca)	1.3	2.6	1.2	2.3	1.1	1.2	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	4.5	4.9	4.9	4.5	4.9	5.3	-	-	-
Magnesium (as Mg)	1.1	1.2	1.2	1.1	1.2	1.3	<70	70-100	7 years
Sodium (as Na)	6.1	6.1	6.1	6.1	6.2	6.1	<200	200-400	7 years
Potassium (as K)	0.44	0.55	0.55	0.55	0.33	0.44	<50	50-100	7 years
Zinc (as Zn)	0.04	0.02	<0.01	0.05	<0.01	<0.01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	9.2	11.0	9.2	9.2	12.8	11.0	<200	200-600	7 years
Fluoride (as F)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<400	400-600	7 years

Sample Marked :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	30	40	30	30	30	30	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0.23	0.22	0.22	0.24	0.25	0.27	<10	10-20	7 years
Nitrate Nitrogen (as N)	0.23	0.22	0.22	0.24	0.25	0.27	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	280	270	280	226	80	80	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	<14	40	<14	20	20	40	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	1	2	3	4	5	6	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	Nil	172	Nil	2	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : 7. **WBWMOD-001 : 469 River Singel ex Op-die-Berg**
8. **WBWMOD-002 : Clinic ex Op-die-Berg**
9. **WBWMOD-003 : Tap ex Op-die-Berg**
10. **WBWMPR-001 : Reservoir. Post-Chlorination ex Prince Alfred Hamlet**
11. **WBWMPR-002 : 266 Steve Tshewete St. Kliprug ex Prince Alfred Hamlet**
12. **WBWMPR-003 : Municipal Offices ex Prince Alfred Hamlet**

Sample Marked :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	4.36	4.34	4.16	6.15	6.26	6.25	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	6.0	5.9	6.5	115	45.5	117	<150	150-370	7 years
Turbidity (NTU)	0.26	0.24	0.26	6.7	1.5	6.3	<1	1-5	No Limit [d]
Odour (Threshold Odour Number)	-	-	-	-	-	-	<5	5-10	No Limit [b]
Langelier Saturation Index	UDF	UDF	UDF	-1.59	-2.11	-1.50	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	<1	<1	<1	<1	<1	<1	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-308	-326	-521	-151	-83.8	-130	-	-	-
Total Alkalinity (as $CaCO_3$)	<1.0	<1.0	<1.0	80.0	40.0	84.0	-	-	-
Total Hardness (as $CaCO_3$)	9.5	9.0	8.7	361	134	348	-	-	-
Calcium Hardness (as $CaCO_3$)	3.3	3.3	3.0	230	85.0	217	-	-	-
Calcium (as Ca)	1.3	1.3	1.2	91.9	34.0	86.9	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	6.2	5.7	5.7	131	49.2	131	-	-	-
Magnesium (as Mg)	1.5	1.4	1.4	32.0	12.0	32.0	<70	70-100	7 years
Sodium (as Na)	7.7	7.7	7.7	111	40.4	106	<200	200-400	7 years
Potassium (as K)	0.55	0.44	0.44	1.9	0.88	1.7	<50	50-100	7 years
Zinc (as Zn)	0.01	0.06	0.05	0.05	0.04	0.05	<5.0	5.0-10.0	1 year
Chloride (as Cl)	11.0	9.2	11.0	239	93.6	242	<200	200-600	7 years
Fluoride (as F)	<0.10	<0.10	<0.10	0.11	<0.10	<0.10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4.0	<4.0	<4.0	96.0	31.0	92.0	<400	400-600	7 years

Sample Marked :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	40	40	50	760	310	780	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	<0.15	<0.15	<0.15	0.19	<0.15	<0.15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	1.6	1.7	1.5	<0.05	<0.05	<0.05	<10	10-20	7 years
Nitrate Nitrogen (as N)	1.6	1.7	1.5	<0.05	<0.05	<0.05	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	<10	<10	<10	1012	96	740	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	748	258	700	<100	100-1 000	7 years
Aluminium (as Al)	160	140	194	20	<14	<14	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	7	8	9	10	11	12	Allowable Compliance Contribution [e] 95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	10	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	240	572	792	1540	Nil	748	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **13 WBWMPR-004 : Tap ex Prince Alfred Hamlet**
14 WBWMTB-001 : Water Treatment Works. Final ex Tulbagh
15. WBWMTB-002 : Municipal Office ex Tulbagh
16. WBWMTB-003 : Bloekombossie Restaurant ex Tulbagh
17. WBWMTB-004 : Central Town ex Tulbagh
18. WBWMTB-005 : Clinic ex Tulbagh

Sample Marked :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	6.31	8.90	6.65	8.93	6.74	6.56	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	45.9	13.3	10.0	12.7	9.5	9.8	<150	150-370	7 years
Turbidity (NTU)	1.5	1.6	1.7	2.2	2.8	2.5	<1	1-5	No Limit [d]
Odour (Threshold Odour Number)	-	-	-	-	-	-	<5	5-10	No Limit [b]
Langelier Saturation Index	-2.07	0.06	-2.91	-0.03	-2.87	-3.07	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	<1	7	8	6	8	8	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-75.6	0.50	-19.2	-0.10	-16.5	-22.9	-	-	-
Total Alkalinity (as $CaCO_3$)	40.0	32.0	16.0	28.0	16.0	16.0	-	-	-
Total Hardness (as $CaCO_3$)	134	38.8	21.7	35.2	20.1	20.0	-	-	-
Calcium Hardness (as $CaCO_3$)	84.8	29.8	11.0	25.8	9.8	9.3	-	-	-
Calcium (as Ca)	33.9	11.9	4.4	10.3	3.9	3.7	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	49.6	9.0	10.7	9.4	10.3	10.7	-	-	-
Magnesium (as Mg)	12.1	2.2	2.6	2.3	2.5	2.6	<70	70-100	7 years
Sodium (as Na)	39.7	13.8	13.9	13.9	14.1	14.1	<200	200-400	7 years
Potassium (as K)	0.99	0.66	0.77	0.77	0.77	0.66	<50	50-100	7 years
Zinc (as Zn)	0.05	<0.01	0.01	<0.01	0.02	0.03	<5.0	5.0-10.0	1 year
Chloride (as Cl)	95.4	22.0	20.2	23.9	20.2	18.3	<200	200-600	7 years
Fluoride (as F)	<0.10	0.10	<0.10	0.12	0.10	<0.10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	27.0	6.0	5.0	<4.0	<4.0	4.0	<400	400-600	7 years

Sample Marked :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	310	100	70	90	70	70	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	<0.05	<0.05	0.06	<0.05	0.12	0.07	<10	10-20	7 years
Nitrate Nitrogen (as N)	<0.05	<0.05	0.06	<0.05	0.12	0.07	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	200	<10	70	80	140	160	<200	200-2 000	7 years [b]
Manganese (as Mn)	260	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	<14	<14	<14	<14	20	78	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	13	14	15	16	17	18	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	Nil	2200	1012	2464	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **19 WBWMTB-006 : Wastewater Treatment Works Tap ex Tulbagh**
20 WBWMTB-007 : Shell Garage. Main Road ex Tulbagh
21 WBWMWO-001 : Water Treatment Works. Final ex Wolseley
22 WBWMWO-002 : No. 4. NPK. Pine Valley ex Wolseley
23 WBWMWO-003 : Municipal Office ex Wolseley
24 WBWMWO-004 : stamperstraat reservoir

Sample Marked :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	6.56	6.60	5.66	5.32	5.22	5.07	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	9.8	10.0	2.6	2.2	1.9	1.9	<150	150-370	7 years
Turbidity (NTU)	1.7	1.6	0.72	0.35	0.37	0.44	<1	1-5	No Limit [d]
Langelier Saturation Index	-3.02	-2.98	-4.96	-5.30	-5.40	-5.55	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	10	9	1	<1	<1	8	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-22.8	-21.1	-81.4	-160	-192	-248	-	-	-
Total Alkalinity (as $CaCO_3$)	16.0	16.0	8.0	8.0	8.0	8.0	-	-	-
Total Hardness (as $CaCO_3$)	20.8	21.2	3.5	3.5	3.5	3.5	-	-	-
Calcium Hardness (as $CaCO_3$)	10.5	10.5	1.7	1.7	1.7	1.7	-	-	-
Calcium (as Ca)	4.2	4.2	0.66	0.66	0.66	0.66	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	10.3	10.7	1.8	1.8	1.8	1.8	-	-	-
Magnesium (as Mg)	2.5	2.6	0.44	0.44	0.44	0.44	<70	70-100	7 years
Sodium (as Na)	13.4	13.8	3.5	3.5	3.5	3.5	<200	200-400	7 years
Potassium (as K)	0.77	0.77	0.11	<0.09	<0.09	<0.09	<50	50-100	7 years
Zinc (as Zn)	0.03	<0.01	0.01	0.04	0.01	0.02	<5.0	5.0-10.0	1 year
Chloride (as Cl)	20.2	22.0	9.2	7.3	7.3	7.3	<200	200-600	7 years
Fluoride (as F)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	7.0	<4.0	<4.0	<4.0	<4.0	<4.0	<400	400-600	7 years

Sample Marked :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	70	70	20	20	15	15	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0.06	0.11	0.11	0.09	0.16	0.08	<10	10-20	7 years
Nitrate Nitrogen (as N)	0.06	0.11	0.11	0.09	0.16	0.08	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	260	210	180	60	160	180	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	80	80	72	60	30	<14	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	19	20	21	22	23	24	Allowable Compliance Contribution [e] 95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] (count/100 ml)	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] (count/100 ml)	Nil	Nil	Nil	4	Nil	12	-	-	-
Heterotrophic Plate Count [h] (count/ml)	350	260	2	Nil	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

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T.R. DAVIES Pr.Sci.Nat.
Chartered Water & Environmental Manager
DIRECTOR

148/2/2/1138
12 April 2010

TO : WITZENBERG MUNICIPALITY
P O Box 44
CERES
6835

Attention : MR JOHAN SWANEPOEL

APPENDIX 1 : Specific Methods used for the Analysis of Parameters indicated in this report.

Parameter	Method	Estimated Uncertainty (%)
pH (at 25 ℃) - Lab	SABS 11 : (1990 – 3rd Revision)	0,019
pH (at 25 ℃) – Field*	SABS 11 : (1990 – 3rd Revision)	-
Langelier Saturation Index (at 25 ℃)*	Calculation	-
Conductivity (mS/m) (at 25 ℃)	STD Method 2501 A (1992)	2,15
Turbidity (NTU)	Hach 8237	1,81
Colour (mg/l as Pt)*	Hach 8025	-
Total Alkalinity (mg/l as $CaCO_3$)*	STD Methods 2320 (1992)	-
Total Hardness (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Calcium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Magnesium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,08
Chloride (mg/l as Cl)	SABS 202 (2nd Revision)	0,08
Fluoride (mg/l as F)	Hach 8029	0,19
Iron (µg/l as Fe)	SANS 5207 (2004)	0,09
Manganese (µg/l as Mn)	SANS 5209 (2005)	0,09
Aluminium (µg/l as Al)	SANS 6169 (2005)	0,14
Calcium Carbonate Precipitation Potential*	Calculation	-
Free Chlorine (mg/l)*	Lovibond Method 3	-
Sodium (mg/l as Na)	SANS 6050 (2004)	0,08
Potassium (mg/l as K)	STD Method 3111 B (1992)	0,07
Zinc (mg/l as Zn)	SANS 5214 (2005)	0,08
Nitrate Nitrogen (mg/l as N)	Hach 8150	0,12
Nitrate Nitrogen (mg/l as N)	Lovibond Method using Brucine	0,057
Nitrite Nitrogen (mg/l as N)	Lovibond Method	0,08
Nitrate & Nitrite Nitrogen (mg/l as N)	Hach 8150	-
Ammonia (mg/l as N)	STD Method 4500-NH_3:C (1992)	0,07
Sulphate (mg/l as SO4)	Hach 8051	0,17
Total Dissolved Solids*	STD Method 2501 A (1992)	1,63
E.coli (organisms per 100 ml)*	SABS 221 (2002)	-
Coliforms (organisms per 100 ml)*	SABS 221 (2002)	-
Total Plate Count (organisms per ml)*	Petrifilm ™	-
Faecal coliforms (organisms per 100 ml)*	SABS SM 221 (2002)	-
Settleable Solids (ml/l)*	STD Method 2540 F (1992)	-
Chemical Oxygen Demand (mg/l)	SANS 6048 (2005)	0,08
Total Kjeldahl Nitrogen (mg/l)*	Hach 8075	-
Dissolved Oxygen (mg/l)*	STD Method 4500 O-G	-
Total Suspended Solids (mg/l)*	STD Method 2540 D (1992)	-
Volatile Suspended Solids (mg/l)*	STD Method 2540 E (1992)	-
Total Phosphate (mg/l as P)*	STD Method 4500-PB (1992) / Hach 8114	-
Ortho Phosphate (mg/l as P)*	Hach 8114	-
Copper (µg/l as Cu)	SANS 5203 (2005)	0,13

*** Tests marked "Not SANAS Accredited" in this report are not included in the SANAS Schedule of Accreditation for this laboratory.**

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7915
SOUTH AFRICA

WITZENBERG MUNICIPALITY

SAMPLE : 24 Samples of Water, marked

1. WBWMCR-001 : Reservoir. Final. Post-Chlorination ex Ceres
2. WBWMCR-002 : Wastewater Treatment Works ex Ceres
3. WBWMCR-003 : Nduli Intermediate School ex Ceres
4. WBWMCR-004 : John Steyn Library ex Ceres
5. WBWMCR-005 : Bella Vista Clinic ex Ceres
6. WBWMCR-006 : 41 Chris Hani ex Ceres

DATE RECEIVED : 10 May 2010

OUR REF. : cc/sc/148/2/2/1586 **LAB DATA SHEET NO. : 10/1124**

17 May 2010

Sample Marked :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	6.09	5.88	5.52	5.62	5.58	5.49	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	3.6	4.0	3.7	4.0	3.9	3.6	<150	150-370	7 years
Turbidity (NTU)	2.7	1.7	3.5	1.7	1.5	2.6	<1	1-5	No Limit [d]
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	12	14	17	3	12	6	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	8.0	8.0	8.0	8.0	8.0	8.0	-	-	-
Total Hardness (as $CaCO_3$)	8.8	9.9	7.9	9.6	9.9	8.4	-	-	-
Calcium Hardness (as $CaCO_3$)	4.3	5.8	3.0	5.5	5.8	4.3	-	-	-
Calcium (as Ca)	1.7	2.3	1.2	2.2	2.3	1.7	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	4.5	4.1	4.9	4.1	4.1	4.1	-	-	-
Magnesium (as Mg)	1.1	0.99	1.2	0.99	0.99	0.99	<70	70-100	7 years
Sodium (as Na)	5.3	5.1	5.1	5.0	5.1	5.1	<200	200-400	7 years
Potassium (as K)	0.33	0.22	0.22	0.22	0.22	0.22	<50	50-100	7 years
Zinc (as Zn)	0.02	0.02	0.02	0.02	0.02	0.02	<5.0	5.0-10.0	1 year
Chloride (as Cl)	15.1	9.4	9.4	9.4	9.4	11.3	<200	200-600	7 years
Fluoride (as F)	<0.10	<0.10	<0.10	<0.10	0.49	<0.10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<400	400-600	7 years

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	23	24	23	26	25	23	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0.33	0.36	0.29	0.26	0.27	0.41	<10	10-20	7 years
Nitrate Nitrogen (as N)	0.33	0.36	0.29	0.26	0.27	0.41	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	40	150	118	60	72	100	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	70	54	58	56	62	68	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	1	2	3	4	5	6	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	3	Nil	3	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	1	1	1	1	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **7. WBWMOD-001 : 469 River Singel ex Op-die-Berg**

8. WBWMOD-002 : Clinic ex Op-die-Berg

9. WBWMOD-003 : Tap ex Op-die-Berg

10. WBWMPR-001 : Reservoir. Post-Chlorination ex Prince Alfred Hamlet

11. WBWMPR-002 : 266 Steve Tshewete St. Kliprug ex Prince Alfred Hamlet

12. WBWMPR-003 : Municipal Offices ex Prince Alfred Hamlet

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	4.54	4.53	4.08	4.80	4.94	5.01	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	5.4	5.4	5.4	3.2	3.4	3.7	<150	150-370	7 years
Turbidity (NTU)	0.57	0.71	0.43	0.61	0.88	0.71	<1	1-5	No Limit [d]
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	20	8	7	<1	9	13	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	<1.0	<1.0	<1.0	<1.0	<1.0	4.0	-	-	-
Total Hardness (as $CaCO_3$)	10.8	12.7	9.4	7.0	8.0	8.7	-	-	-
Calcium Hardness (as $CaCO_3$)	5.5	7.8	4.5	4.3	5.3	6.0	-	-	-
Calcium (as Ca)	2.2	3.1	1.8	1.7	2.1	2.4	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	5.3	4.9	4.9	2.7	2.7	2.7	-	-	-
Magnesium (as Mg)	1.3	1.2	1.2	0.66	0.66	0.66	<70	70-100	7 years
Sodium (as Na)	6.4	6.4	6.4	4.6	4.6	4.7	<200	200-400	7 years
Potassium (as K)	0.22	0.22	0.22	0.44	0.44	0.44	<50	50-100	7 years
Zinc (as Zn)	0.23	0.06	0.04	<0.01	0.02	<0.01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	11.3	13.2	13.2	11.3	9.4	9.4	<200	200-600	7 years
Fluoride (as F)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<400	400-600	7 years

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	36	35	36	21	22	24	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	1.6	1.6	2.2	0.15	<0.05	0.10	<10	10-20	7 years
Nitrate Nitrogen (as N)	1.6	1.6	2.2	0.15	<0.05	0.1	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	44	<10	<10	<10	<10	<10	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	194	116	180	82	30	24	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	7	8	9	10	11	12	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Total Coliform Bacteria [g] **(count/100 ml)**	1	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	12	20	Nil	Nil	2	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **13 WBWMPR-004 : Tap ex Prince Alfred Hamlet**

14 WBWMTB-001 : Water Treatment Works. Final ex Tulbagh

15. WBWMTB-002 : Municipal Office ex Tulbagh

16. WBWMTB-003 : Bloekombossie Restaurant ex Tulbagh

17. WBWMTB-004 : Central Town ex Tulbagh

18. WBWMTB-005 : Clinic ex Tulbagh

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	5.00	9.97	6.55	6.47	6.37	6.28	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	3.2	21.7	8.3	8.4	8.0	7.9	<150	150-370	7 years
Turbidity (NTU)	0.79	1.3	1.5	0.98	2.0	1.6	<1	1-5	No Limit [d]
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	15	8	36	9	17	16	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-	-	-	-	-	-	-	-	-
Total Alkalinity (as $CaCO_3$)	4.0	56.0	12.0	12.0	8.0	8.0	-	-	-
Total Hardness (as $CaCO_3$)	7.1	66.2	16.5	17.5	16.8	16.8	-	-	-
Calcium Hardness (as $CaCO_3$)	4.8	64.8	8.3	8.5	7.8	7.8	-	-	-
Calcium (as Ca)	1.9	25.9	3.3	3.4	3.1	3.1	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	2.3	1.4	8.2	9.0	9.0	9.0	-	-	-
Magnesium (as Mg)	0.55	0.33	2.0	2.2	2.2	2.2	<70	70-100	7 years
Sodium (as Na)	4.7	10.6	9.4	10.1	9.0	9.1	<200	200-400	7 years
Potassium (as K)	0.44	0.55	0.55	0.44	0.55	0.55	<50	50-100	7 years
Zinc (as Zn)	0.02	0.03	<0.01	<0.01	<0.01	<0.01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	22.6	18.9	18.9	18.9	20.8	18.9	<200	200-600	7 years
Fluoride (as F)	<0.10	0.17	0.26	1.1	0.32	0.66	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<400	400-600	7 years

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	21	144	55	55	53	52	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0.16	<0.05	<0.05	<0.05	<0.05	0.12	<10	10-20	7 years
Nitrate Nitrogen (as N)	0.16	<0.05	<0.05	<0.05	<0.05	0.12	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	26	14	<10	<10	30	82	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	42	88	70	66	110	86	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	13	14	15	16	17	18	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Total Coliform Bacteria [g] **(count/100 ml)**	6	Nil	1	Nil	Nil	1	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	3	Nil	1	1	1	1	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **19 WBWMTB-006 : Wastewater Treatment Works Tap ex Tulbagh**
20 WBWMTB-007 : Shell Garage. Main Road ex Tulbagh
21 WBWMWO-001 : Water Treatment Works. Final ex Wolseley
22 WBWMWO-002 : No. 4. NPK. Pine Valley ex Wolseley
23 WBWMWO-003 : Municipal Office ex Wolseley
24 WBWMWO-004 : stamperstraat reservoir

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	6.32	6.24	3.83	4.05	4.07	3.55	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	8.5	8.4	3.7	1.6	1.6	3.0	<150	150-370	7 years
Turbidity (NTU)	2.2	1.3	1.2	1.6	2.1	1.3	<1	1-5	No Limit [d]
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	6	19	13	19	19	18	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	12.0	12.0	<1.0	<1.0	<1.0	<1.0	-	-	-
Total Hardness (as $CaCO_3$)	17.0	17.0	2.8	2.4	2.8	2.4	-	-	-
Calcium Hardness (as $CaCO_3$)	8.0	8.0	1.9	1.9	1.9	1.9	-	-	-
Calcium (as Ca)	3.2	3.2	0.77	0.77	0.77	0.77	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	9.0	9.0	0.9	0.5	0.9	0.5	-	-	-
Magnesium (as Mg)	2.2	2.2	<0.30	<0.30	<0.30	<0.30	<70	70-100	7 years
Sodium (as Na)	10.0	10.0	2.1	2.1	2.1	2.1	<200	200-400	7 years
Potassium (as K)	0.44	0.44	0.11	0.11	0.11	0.11	<50	50-100	7 years
Zinc (as Zn)	<0.01	<0.01	<0.01	0.02	0.02	0.02	<5.0	5.0-10.0	1 year
Chloride (as Cl)	20.8	9.4	5.7	3.8	5.7	5.7	<200	200-600	7 years
Fluoride (as F)	0.12	0.11	<0.10	<0.10	0.15	0.38	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<400	400-600	7 years

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	56	55	24	11	12	20	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	0.24	0.32	0.86	0.72	0.66	0.90	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0.46	0.39	0.23	0.29	0.19	0.07	<10	10-20	7 years
Nitrate Nitrogen (as N)	0.46	0.39	0.23	0.29	0.19	0.07	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	24	32	28	30	60	<10	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	62	76	128	132	120	116	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Determinand	19	20	21	22	23	24	Allowable Compliance Contribution [e] 95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] (count/100 ml)	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Total Coliform Bacteria [g] (count/100 ml)	Nil	Nil	Nil	Nil	1	Nil	-	-	-
Heterotrophic Plate Count [h] (count/ml)	Nil	494	Nil	Nil	Nil	1	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

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T.R. DAVIES Pr.Sci.Nat.
Chartered Water & Environmental Manager
DIRECTOR

148/2/2/1586
17 May 2010

TO : WITZENBERG MUNICIPALITY
P O Box 44
CERES
6835

Attention : MR JOHAN SWANEPOEL

APPENDIX 1 : Specific Methods used for the Analysis of Parameters indicated in this report.

Parameter	Method	Estimated Uncertainty (%)
pH (at 25 °C) - Lab	SABS 11 : (1990 – 3rd Revision)	0,019
pH (at 25 °C) – Field*	SABS 11 : (1990 – 3rd Revision)	-
Langelier Saturation Index (at 25 °C)*	Calculation	-
Conductivity (mS/m) (at 25 °C)	STD Method 2501 A (1992)	2,15
Turbidity (NTU)	Hach 8237	1,81
Colour (mg/l as Pt)*	Hach 8025	-
Total Alkalinity (mg/l as $CaCO_3$)*	STD Methods 2320 (1992)	-
Total Hardness (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Calcium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Magnesium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,08
Chloride (mg/l as Cl)	SABS 202 (2nd Revision)	0,08
Fluoride (mg/l as F)	Hach 8029	0,19
Iron (µg/l as Fe)	SANS 5207 (2004)	0,09
Manganese (µg/l as Mn)	SANS 5209 (2005)	0,09
Aluminium (µg/l as Al)	SANS 6169 (2005)	0,14
Calcium Carbonate Precipitation Potential*	Calculation	-
Free Chlorine (mg/l)*	Lovibond Method 3	-
Sodium (mg/l as Na)	SANS 6050 (2004)	0,08
Potassium (mg/l as K)	STD Method 3111 B (1992)	0,07
Zinc (mg/l as Zn)	SANS 5214 (2005)	0,08
Nitrate Nitrogen (mg/l as N)	Hach 8150	0,12
Nitrate Nitrogen (mg/l as N)	Lovibond Method using Brucine	0,057
Nitrite Nitrogen (mg/l as N)	Lovibond Method	0,08
Nitrate & Nitrite Nitrogen (mg/l as N)	Hach 8150	-
Ammonia (mg/l as N)	STD Method 4500-NH_3:C (1992)	0,07
Sulphate (mg/l as SO4)	Hach 8051	0,17
Total Dissolved Solids*	STD Method 2501 A (1992)	1,63
E.coli (organisms per 100 ml)	SABS 221 (2002)	-
Coliforms (organisms per 100 ml)	SABS 221 (2002)	-
Total Plate Count (organisms per ml)	Petrifilm ™	-
Faecal coliforms (organisms per 100 ml)	SABS SM 221 (2002)	-
Settleable Solids (ml/l)*	STD Method 2540 F (1992)	-
Chemical Oxygen Demand (mg/l)	SANS 6048 (2005)	0,08
Total Kjeldahl Nitrogen (mg/l)*	Hach 8075	-
Dissolved Oxygen (mg/l)*	STD Method 4500 O-G	-
Total Suspended Solids (mg/l)*	STD Method 2540 D (1992)	-
Volatile Suspended Solids (mg/l)*	STD Method 2540 E (1992)	-
Total Phosphate (mg/l as P)*	STD Method 4500-PB (1992) / Hach 8114	-
Ortho Phosphate (mg/l as P)*	Hach 8114	-
Copper (µg/l as Cu)	SANS 5203 (2005)	0,13

*** Tests marked "Not SANAS Accredited" in this report are not included in the SANAS Schedule of Accreditation for this laboratory.**

(Schedule of Accreditation excludes sampling)

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SOUTH AFRICA

DRINKING WATER SAMPLES

SAMPLE : 24 Samples of Water, marked

1. WBWMCR-001 : Reservoir. Final. Post-Chlorination ex Ceres
2. WBWMCR-002 : Wastewater Treatment Works ex Ceres
3. WBWMCR-003 : Nduli Intermediate School ex Ceres
4. WBWMCR-004 : John Steyn Library ex Ceres
5. WBWMCR-005 : Bella Vista Clinic ex Ceres
6. WBWMCR-006 : 41 Chris Hani ex Ceres

DATE RECEIVED : 17 June 2010

OUR REF. : cc/sc/148/2/2/2123 **LAB DATA SHEET NO. : 10/1543**
1 July 2010

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	7.58	7.37	7.15	7.05	7.02	6.76	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	3.2	3.3	2.7	3.5	3.3	3.2	<150	150-370	7 years
Turbidity (NTU)	1.9	1.5	1.4	1.3	1.1	1.1	<1	1-5	No Limit [d]
Langelier Saturation Index	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	22	17	16	18	13	19	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-	-	-	-	-	-	-	-	-
Total Alkalinity (as $CaCO_3$)	8.0	8.0	8.0	8.0	8.0	8.0	-	-	-
Total Hardness (as $CaCO_3$)	7.7	9.2	9.0	9.8	10.7	10.7	-	-	-
Calcium Hardness (as $CaCO_3$)	2.8	3.5	3.3	5.3	4.5	4.5	-	-	-
Calcium (as Ca)	1.1	1.4	1.3	2.1	1.8	1.8	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	4.9	5.7	5.7	4.5	6.2	6.2	-	-	-
Magnesium (as Mg)	1.2	1.4	1.4	1.1	1.5	1.5	<70	70-100	7 years
Sodium (as Na)	5.5	5.2	5.2	5.2	5.2	5.2	<200	200-400	7 years
Potassium (as K)	0.33	0.22	0.22	0.22	0.22	0.22	<50	50-100	7 years
Zinc (as Zn)	<0.01	0.01	0.02	0.02	0.01	<0.01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	3.7	5.5	5.5	5.5	7.3	5.5	<200	200-600	7 years
Fluoride (as F)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<400	400-600	7 years

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	25	26	22	28	25	24	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	<0.15	<0.15	0.17	0.16	<0.15	<0.15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0.13	0.18	0.16	0.19	0.08	0.21	<10	10-20	7 years
Nitrate Nitrogen (as N)	0.13	0.18	0.16	0.19	0.08	0.21	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	<10	<10	<10	12	<10	<10	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	80	80	60	100	40	60	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	1	2	3	4	5	6	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	1	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	Nil	Nil	1	1	3	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : 7. **WBWMOD-001 : 469 River Singel ex Op-die-Berg**
8. **WBWMOD-002 : Clinic ex Op-die-Berg**
9. **WBWMOD-003 : Tap ex Op-die-Berg**
10. **WBWMPR-001 : Reservoir. Post-Chlorination ex Prince Alfred Hamlet**
11. **WBWMPR-002 : 266 Steve Tshewete St. Kliprug ex Prince Alfred Hamlet**
12. **WBWMPR-003 : Municipal Offices ex Prince Alfred Hamlet**

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	5.35	4.97	4.82	5.08	5.07	6.96	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	5.9	5.7	6.0	2.1	2.8	2.9	<150	150-370	7 years
Turbidity (NTU)	0.19	0.20	0.24	1.7	0.95	1.3	<1	1-5	No Limit [d]
Odour (Threshold Odour Number)	-	-	-	-	-	-	<5	5-10	No Limit [b]
Langelier Saturation Index	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	6	<1	<1	25	24	22	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-	-	-	-	-	-	-	-	-
Total Alkalinity (as $CaCO_3$)	8.0	<1.0	<1.0	8.0	8.0	8.0	-	-	-
Total Hardness (as $CaCO_3$)	14.1	14.5	14.8	7.5	9.3	11.0	-	-	-
Calcium Hardness (as $CaCO_3$)	5.5	6.3	5.8	3.0	4.8	4.8	-	-	-
Calcium (as Ca)	2.2	2.5	2.3	1.2	1.9	1.9	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	8.6	8.2	9.0	4.5	4.5	6.2	-	-	-
Magnesium (as Mg)	2.1	2.0	2.2	1.1	1.1	1.5	<70	70-100	7 years
Sodium (as Na)	7.8	7.8	7.7	4.2	5.0	4.7	<200	200-400	7 years
Potassium (as K)	0.22	0.22	0.11	0.11	0.22	0.11	<50	50-100	7 years
Zinc (as Zn)	0.03	0.01	0.01	0.01	0.02	0.02	<5.0	5.0-10.0	1 year
Chloride (as Cl)	9.2	7.3	9.2	7.3	5.5	5.5	<200	200-600	7 years
Fluoride (as F)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<400	400-600	7 years

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	45	42	47	14	19	21	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	<0.15	<0.15	<0.15	0.21	0.23	0.23	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	1.6	1.2	1.8	0.18	<0.05	<0.05	<10	10-20	7 years
Nitrate Nitrogen (as N)	1.6	1.2	1.8	0.18	<0.05	<0.05	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	<10	20	<10	<10	<10	52	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	140	172	140	100	80	100	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
							Allowable Compliance Contribution [e]		
Sample Number :	7	8	9	10	11	12	95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	1	17	Nil	2	3	1	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **13 WBWMPR-004 : Tap ex Prince Alfred Hamlet**
14 WBWMTB-001 : Water Treatment Works. Final ex Tulbagh
15. WBWMTB-002 : Municipal Office ex Tulbagh
16. WBWMTB-003 : Bloekombossie Restaurant ex Tulbagh
17. WBWMTB-004 : Central Town ex Tulbagh
18. WBWMTB-005 : Clinic ex Tulbagh

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	4.74	10.09	8.18	7.94	7.79	7.63	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	2.8	26.2	7.3	7.0	6.1	7.1	<150	150-370	7 years
Turbidity (NTU)	0.50	0.73	1.5	2.0	1.5	1.6	<1	1-5	No Limit [d]
Odour (Threshold Odour Number)	-	-	-	-	-	-	<5	5-10	No Limit [b]
Langelier Saturation Index	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	18	17	48	49	51	51	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-	-	-	-	-	-	-	-	-
Total Alkalinity (as $CaCO_3$)	<1.0	76.0	16.0	12.0	12.0	12.0	-	-	-
Total Hardness (as $CaCO_3$)	9.5	89.3	24.4	23.0	21.9	22.6	-	-	-
Calcium Hardness (as $CaCO_3$)	3.8	84.8	12.5	11.5	10.0	10.3	-	-	-
Calcium (as Ca)	1.5	33.9	5.0	4.6	4.0	4.1	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	5.7	4.5	11.9	11.5	11.9	12.3	-	-	-
Magnesium (as Mg)	1.4	1.1	2.9	2.8	2.9	3.0	<70	70-100	7 years
Sodium (as Na)	5.0	10.0	9.6	9.6	9.6	10.3	<200	200-400	7 years
Potassium (as K)	0.22	0.55	0.55	0.55	0.55	0.77	<50	50-100	7 years
Zinc (as Zn)	0.03	<0.01	0.02	0.03	0.01	0.01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	3.7	18.3	12.8	12.8	11.0	12.8	<200	200-600	7 years
Fluoride (as F)	<0.10	0.13	<0.10	<0.10	0.12	<0.10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<400	400-600	7 years

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	19	182	52	50	46	51	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	0.22	<0.15	0.24	0.17	0.16	0.22	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	10-20	7 years
Nitrate Nitrogen (as N)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	<10	<10	<10	<10	20	<10	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	112	80	40	60	80	60	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	13	14	15	16	17	18	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli **[f] (count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] (count/100 ml)	Nil	Nil	Nil	10	1	2	-	-	-
Heterotrophic Plate Count [h] (count/ml)	2	Nil	12	37	3	21	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **19 WBWMTB-006 : Wastewater Treatment Works Tap ex Tulbagh**
20 WBWMTB-007 : Shell Garage. Main Road ex Tulbagh
21 WBWMWO-001 : Water Treatment Works. Final ex Wolseley
22 WBWMWO-002 : No. 4. NPK. Pine Valley ex Wolseley
23 WBWMWO-003 : Municipal Office ex Wolseley
24 WBWMWO-004 : stamperstraat reservoir

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	7.55	7.48	7.44	7.09	6.80	6.52	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	7.2	7.1	0.7	2.0	1.1	1.1	<150	150-370	7 years
Turbidity (NTU)	0.79	0.63	0.85	0.97	0.85	1.0	<1	1-5	No Limit [d]
Langelier Saturation Index	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	25	28	32	28	32	28	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-	-	-	-	-	-	-	-	-
Total Alkalinity (as $CaCO_3$)	12.0	12.0	8.0	8.0	8.0	8.0	-	-	-
Total Hardness (as $CaCO_3$)	23.1	22.7	9.2	12.5	12.0	12.2	-	-	-
Calcium Hardness (as $CaCO_3$)	10.8	10.8	3.5	5.5	5.8	4.8	-	-	-
Calcium (as Ca)	4.3	4.3	1.4	2.2	2.3	1.9	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	12.3	11.9	5.7	7.0	6.2	7.4	-	-	-
Magnesium (as Mg)	3.0	2.9	1.4	1.7	1.5	1.8	<70	70-100	7 years
Sodium (as Na)	9.7	9.9	2.0	2.0	3.7	1.9	<200	200-400	7 years
Potassium (as K)	0.44	0.66	<0.09	<0.09	<0.09	<0.09	<50	50-100	7 years
Zinc (as Zn)	0.01	0.02	<0.01	0.02	0.02	0.01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	14.7	14.7	3.7	1.8	1.8	1.8	<200	200-600	7 years
Fluoride (as F)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	5.0	<4.0	<4.0	<4.0	<4.0	<4.0	<400	400-600	7 years

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	49	49	12	15	8	9	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	0.26	0.62	0.88	1.0	1.0	0.64	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	10-20	7 years
Nitrate Nitrogen (as N)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-
Nitrite Nitrogen (as N)	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	<10	<10	<10	42	34	<10	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	40	60	80	120	120	100	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
							Allowable Compliance Contribution [e]		
Sample Number :	19	20	21	22	23	24	95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	27	21	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	1007	2310	1	2	1	2	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

……

N. VAN BINSBERGEN Pr.Sci.Nat.
DIRECTOR

148/2/2/2123
1 July 2010

TO : WITZENBERG MUNICIPALITY
P O Box 44
CERES
6835

Attention : MR JOHAN SWANEPOEL

APPENDIX 1 : Specific Methods used for the Analysis of Parameters indicated in this report.

Parameter	Method	Estimated Uncertainty (%)
pH (at 25 °C) - Lab	SABS 11 : (1990 – 3rd Revision)	0,019
pH (at 25 °C) – Field*	SABS 11 : (1990 – 3rd Revision)	-
Langelier Saturation Index (at 25 °C)*	Calculation	-
Conductivity (mS/m) (at 25 °C)	STD Method 2501 A (1992)	2,15
Turbidity (NTU)	Hach 8237	1,81
Colour (mg/l as Pt)*	Hach 8025	-
Total Alkalinity (mg/l as $CaCO_3$)*	STD Methods 2320 (1992)	-
Total Hardness (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Calcium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Magnesium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,08
Chloride (mg/l as Cl)	SABS 202 (2nd Revision)	0,08
Fluoride (mg/l as F)	Hach 8029	0,19
Iron (µg/l as Fe)	SANS 5207 (2004)	0,09
Manganese (µg/l as Mn)	SANS 5209 (2005)	0,09
Aluminium (µg/l as Al)	SANS 6169 (2005)	0,14
Calcium Carbonate Precipitation Potential*	Calculation	-
Free Chlorine (mg/l)*	Lovibond Method 3	-
Sodium (mg/l as Na)	SANS 6050 (2004)	0,08
Potassium (mg/l as K)	STD Method 3111 B (1992)	0,07
Zinc (mg/l as Zn)	SANS 5214 (2005)	0,08
Nitrate Nitrogen (mg/l as N)	Hach 8150	0,12
Nitrate Nitrogen (mg/l as N)	Lovibond Method using Brucine	0,057
Nitrite Nitrogen (mg/l as N)	Lovibond Method	0,08
Nitrate & Nitrite Nitrogen (mg/l as N)	Hach 8150	-
Ammonia (mg/l as N)	STD Method 4500-NH_3:C (1992)	0,07
Sulphate (mg/l as SO4)	Hach 8051	0,17
Total Dissolved Solids*	STD Method 2501 A (1992)	1,63
E.coli (organisms per 100 ml)	SABS 221 (2002)	-
Coliforms (organisms per 100 ml)	SABS 221 (2002)	-
Total Plate Count (organisms per ml)	Petrifilm ™	-
Faecal coliforms (organisms per 100 ml)	SABS SM 221 (2002)	-
Settleable Solids (ml/l)*	STD Method 2540 F (1992)	-
Chemical Oxygen Demand (mg/l)	SANS 6048 (2005)	0,08
Total Kjeldahl Nitrogen (mg/l)*	Hach 8075	-
Dissolved Oxygen (mg/l)*	STD Method 4500 O-G	-
Total Suspended Solids (mg/l)*	STD Method 2540 D (1992)	-
Volatile Suspended Solids (mg/l)*	STD Method 2540 E (1992)	-
Total Phosphate (mg/l as P)*	STD Method 4500-PB (1992) / Hach 8114	-
Ortho Phosphate (mg/l as P)*	Hach 8114	-
Copper (µg/l as Cu)	SANS 5203 (2005)	0,13

*** Tests marked "Not SANAS Accredited" in this report are not included in the SANAS Schedule of Accreditation for this laboratory.**

(Schedule of Accreditation excludes sampling)

A.L. ABBOTT AND ASSOCIATES (PTY) LTD

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7915
SOUTH AFRICA

Certificate of Analysis

WITZENBERG MUNICIPALITY

SAMPLE : 24 Samples of Drinking Water, marked

1. WBWMCR-001 : Reservoir. Final. Post-Chlorination ex Ceres
2. WBWMCR-002 : Wastewater Treatment Works ex Ceres (No Sample Received)
3. WBWMCR-003 : Nduli Intermediate School ex Ceres
4. WBWMCR-004 : John Steyn Library ex Ceres
5. WBWMCR-005 : Bella Vista Clinic ex Ceres
6. WBWMCR-006 : 41 Chris Hani ex Ceres

DATE RECEIVED : 5 July 2010

OUR REF. : sc/148/2/2/2458
23 July 2010

LAB DATA SHEET NO. : 10/1681

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	5,65	No Sample Received	5,35	5,88	5,68	5,29	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	3,1		3,4	3,5	2,9	3,1	<150	150-370	7 years
Turbidity (NTU)	1,8		1,7	1,7	1,4	1,8	<1	1-5	No Limit [d]
Langelier Saturation Index	-		-	-	-	-	-	-	-
	mg/l		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	19		26	30	26	23	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-		-	-	-	-	-	-	-
Total Alkalinity (as $CaCO_3$)	8,0		8,0	8,0	8,0	8,0	-	-	-
Total Hardness (as $CaCO_3$)	6,7		6,7	11,5	7,5	7,0	-	-	-
Calcium Hardness (as $CaCO_3$)	2,2		2,2	7,0	3,0	2,5	-	-	-
Calcium (as Ca)	0,88		0,88	2,8	1,2	0,99	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	4,5		4,5	4,5	4,5	4,5	-	-	-
Magnesium (as Mg)	1,1		1,1	1,1	1,1	1,1	<70	70-100	7 years
Sodium (as Na)	5,2		5,0	5,1	5,0	4,8	<200	200-400	7 years
Potassium (as K)	0,44		0,22	0,33	0,22	0,22	<50	50-100	7 years
Zinc (as Zn)	<0,01		<0,01	<0,01	<0,01	<0,01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	7,9		7,9	7,9	7,9	7,9	<200	200-600	7 years
Fluoride (as F)	<0,10		<0,10	<0,10	<0,10	<0,10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0		<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	21	No Sample Received	23	25	19	21	<1000	1000-2400	7 years
Total Suspended Solids	-		-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-		-	-	-	-			
Ammonia Nitrogen (as N)	<0,15		<0,15	<0,15	<0.15	<0.15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0,33		0,39	0,37	0,34	0,35	<10	10-20	7 years
Nitrate Nitrogen (as N)	0,33		0,39	0,37	0,34	0,35	-	-	-
Nitrite Nitrogen (as N)	<0,08		<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l		µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	200		140	374	120	80	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40		<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	100		100	100	120	140	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	1	2	3	4	5	6	Allowable Compliance Contribution [e] 95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	No Sample received	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-		-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil		1	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	1		Nil	3	1	2	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **7. WBWMOD-001 : 469 River Singel ex Op-die-Berg**
8. WBWMOD-002 : Clinic ex Op-die-Berg
9. WBWMOD-003 : Tap ex Op-die-Berg
10. WBWMPR-001 : Reservoir. Post-Chlorination ex Prince Alfred Hamlet
11. WBWMPR-002 : 266 Steve Tshewete St. Kliprug ex Prince Alfred Hamlet
12. WBWMPR-003 : Municipal Offices ex Prince Alfred Hamlet

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	4,17	4,30	4,21	4,17	4,03	4,32	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	6,1	5,9	6,0	2,9	3,9	3,3	<150	150-370	7 years
Turbidity (NTU)	0,29	0,34	0,26	0,32	0,45	0,51	<1	1-5	No Limit [d]
Odour (Threshold Odour Number)	-	-	-	-	-	-	<5	5-10	No Limit [b]
Langelier Saturation Index	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	7	5	13	21	7	8	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-	-	-	-	-	-	-	-	-
Total Alkalinity (as $CaCO_3$)	<1,0	<1,0	<1,0	<1,0	<1,0	<1,0	-	-	-
Total Hardness (as $CaCO_3$)	12,5	12,7	13,5	4,6	6,7	6,2	-	-	-
Calcium Hardness (as $CaCO_3$)	4,3	4,5	5,3	1,9	3,5	3,0	-	-	-
Calcium (as Ca)	1,7	1,8	2,1	0,77	0,14	1,2	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	8,2	8,2	8,2	2,7	3,2	3,2	-	-	-
Magnesium (as Mg)	2,0	2,0	2,0	0,66	0,77	0,77	<70	70-100	7 years
Sodium (as Na)	7,8	7,9	7,7	4,8	5,4	5,1	<200	200-400	7 years
Potassium (as K)	0,22	0,22	0,22	0,22	0,33	0,22	<50	50-100	7 years
Zinc (as Zn)	<0,01	0,02	0,01	<0,01	<0,01	<0,01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	7,9	13,9	11,9	7,9	9,9	7,9	<200	200-600	7 years
Fluoride (as F)	<0,10	<0,10	<0,10	<0,10	<0,10	<0,10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<4,0	<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	45	42	40	20	26	22	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	1,6	1,8	1,9	0,36	0,24	0,22	<10	10-20	7 years
Nitrate Nitrogen (as N)	1,6	1,8	1,9	0,36	0,24	0,22	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	20	20	60	<10	<10	<10	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	300	280	240	120	120	100	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
							Allowable Compliance Contribution [e]		
Sample Number :	7	8	9	10	11	12	95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	2	Nil	Nil	Nil	Nil	4	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	7	29	Nil	Nil	Nil	1	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **13 WBWMPR-004 : Tap ex Prince Alfred Hamlet**
14 WBWMTB-001 : Water Treatment Works. Final ex Tulbagh
15. WBWMTB-002 : Municipal Office ex Tulbagh
16. WBWMTB-003 : Bloekombossie Restaurant ex Tulbagh
17. WBWMTB-004 : Central Town ex Tulbagh
18. WBWMTB-005 : Clinic ex Tulbagh

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	4,53	10,05	6,48	6,11	6,01	5,86	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	3,2	27,6	6,8	6,7	6,7	6,8	<150	150-370	7 years
Turbidity (NTU)	0,47	0,65	2,8	1,6	2,7	3,4	<1	1-5	No Limit [d]
Odour (Threshold Odour Number)	-	-	-	-	-	-	<5	5-10	No Limit [b]
Langelier Saturation Index	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	6	17	44	39	46	45	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-	-	-	-	-	-	-	-	-
Total Alkalinity (as $CaCO_3$)	<1,0	68,0	16,0	12,0	12,0	12,0	-	-	-
Total Hardness (as $CaCO_3$)	8,1	86,0	16,9	16,7	16,7	16,1	-	-	-
Calcium Hardness (as $CaCO_3$)	4,5	85,5	7,5	7,3	7,3	6,3	-	-	-
Calcium (as Ca)	1,8	34,2	3,0	2,9	2,9	2,5	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	3,6	0,5	9,4	9,4	9,4	9,8	-	-	-
Magnesium (as Mg)	0,88	<0,30	2,3	2,3	2,3	2,4	<70	70-100	7 years
Sodium (as Na)	5,1	9,6	9,4	9,4	9,4	9,4	<200	200-400	7 years
Potassium (as K)	0,22	0,44	0,33	0,33	0,44	0,44	<50	50-100	7 years
Zinc (as Zn)	0,01	<0,01	<0,01	0,03	<0,01	<0,01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	7,9	17,8	19,8	17,8	13,9	17,8	<200	200-600	7 years
Fluoride (as F)	<0,10	<0,10	<0,10	<0,10	<0,10	<0,10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<4,0	<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	23	184	49	52	48	46	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	<0,15	<0,15	0,16	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0,25	0,13	0,15	0,11	0,12	0,18	<10	10-20	7 years
Nitrate Nitrogen (as N)	0,25	0,13	0,15	0,11	0,12	0,18	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	<10	<10	<10	140	180	160	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	120	80	140	140	160	220	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	13	14	15	16	17	18	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli **[f] (count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] (count/100 ml)	Nil	3	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] (count/ml)	Nil	Nil	2	17	Nil	247	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : 19 **WBWMTB-006 : Wastewater Treatment Works Tap ex Tulbagh**
20 **WBWMTB-007 : Shell Garage. Main Road ex Tulbagh**
21 **WBWMWO-001 : Water Treatment Works. Final ex Wolseley**
22 **WBWMWO-002 : No. 4. NPK. Pine Valley ex Wolseley**
23 **WBWMWO-003 : Municipal Office ex Wolseley**
24 **WBWMWO-004 : stamperstraat reservoir**

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	5,78	5,68	4,73	4,36	4,40	4,21	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	6,9	6,7	1,1	1,3	1,2	1,3	<150	150-370	7 years
Turbidity (NTU)	0,88	1,5	0,59	0,71	0,90	0,75	<1	1-5	No Limit [d]
Langelier Saturation Index	-	-	-	-	-	-	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	37	46	20	1	18	1	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-	-	-	-	-	-	-	-	-
Total Alkalinity (as $CaCO_3$)	12,0	12,0	<1,0	<1,0	<1,0	<1,0	-	-	-
Total Hardness (as $CaCO_3$)	17,6	16,0	2,9	3,2	3,2	3,1	-	-	-
Calcium Hardness (as $CaCO_3$)	7,8	7,0	1,1	1,4	1,4	1,7	-	-	-
Calcium (as Ca)	3,1	2,8	0,44	0,55	0,55	0,66	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	9,8	9,0	1,8	1,8	1,8	1,4	-	-	-
Magnesium (as Mg)	2,4	2,2	0,44	0,44	0,44	0,33	<70	70-100	7 years
Sodium (as Na)	9,5	9,5	2,5	2,5	2,5	2,3	<200	200-400	7 years
Potassium (as K)	0,44	0,44	<0,09	<0,09	<0,09	<0,09	<50	50-100	7 years
Zinc (as Zn)	0,01	<0,01	<0,01	<0,01	<0,01	0,02	<5.0	5.0-10.0	1 year
Chloride (as Cl)	15,8	5,9	5,9	7,9	5,9	7,9	<200	200-600	7 years
Fluoride (as F)	<0,10	<0,10	<0,10	<0,10	<0,10	<0,10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<4,0	<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	47	46	10	13	12	15	<1000	1000-2400	7 years
Total Suspended Solids	-	-	-	-	-	-	-	-	-
Total kjeldahl nitrogen (as N)	-	-	-	-	-	-			
Ammonia Nitrogen (as N)	0,34	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0,11	0,18	0,14	<0,05	<0,05	<0,05	<10	10-20	7 years
Nitrate Nitrogen (as N)	0,11	0,18	0,14	<0,05	<0,05	<0,05	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	1220	40	60	80	120	20	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	200	140	120	120	100	120	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
							Allowable Compliance Contribution [e]		
Sample Number :	19	20	21	22	23	24	95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	2	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	19	4	Nil	Nil	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

……

N. VAN BINSBERGEN Pr.Sci.Nat.
DIRECTOR

148/2/2/2458
23 July 2010

TO : WITZENBERG MUNICIPALITY
P O Box 44
CERES
6835

Attention : MR JOHAN SWANEPOEL

APPENDIX 1 : Specific Methods used for the Analysis of Parameters indicated in this report.

Parameter	Method	Estimated Uncertainty (%)
pH (at 25 °C) - Lab	SABS 11 : (1990 – 3rd Revision)	0,019
pH (at 25 °C) – Field*	SABS 11 : (1990 – 3rd Revision)	-
Langelier Saturation Index (at 25 °C)*	Calculation	-
Conductivity (mS/m) (at 25 °C)	STD Method 2501 A (1992)	2,15
Turbidity (NTU)	Hach 8237	1,81
Colour (mg/l as Pt)*	Hach 8025	-
Total Alkalinity (mg/l as $CaCO_3$)*	STD Methods 2320 (1992)	-
Total Hardness (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Calcium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Magnesium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,08
Chloride (mg/l as Cl)	SABS 202 (2nd Revision)	0,08
Fluoride (mg/l as F)	Hach 8029	0,19
Iron (µg/l as Fe)	SANS 5207 (2004)	0,09
Manganese (µg/l as Mn)	SANS 5209 (2005)	0,09
Aluminium (µg/l as Al)	SANS 6169 (2005)	0,14
Calcium Carbonate Precipitation Potential*	Calculation	-
Free Chlorine (mg/l)*	Lovibond Method 3	-
Sodium (mg/l as Na)	SANS 6050 (2004)	0,08
Potassium (mg/l as K)	STD Method 3111 B (1992)	0,07
Zinc (mg/l as Zn)	SANS 5214 (2005)	0,08
Nitrate Nitrogen (mg/l as N)	Hach 8150	0,12
Nitrate Nitrogen (mg/l as N)	Lovibond Method using Brucine	0,057
Nitrite Nitrogen (mg/l as N)	Lovibond Method	0,08
Nitrate & Nitrite Nitrogen (mg/l as N)	Hach 8150	-
Ammonia (mg/l as N)	STD Method 4500-NH_3:C (1992)	0,07
Sulphate (mg/l as SO4)	Hach 8051	0,17
Total Dissolved Solids*	STD Method 2501 A (1992)	1,63
E.coli (organisms per 100 ml)	SABS 221 (2002)	-
Coliforms (organisms per 100 ml)	SABS 221 (2002)	-
Total Plate Count (organisms per ml)	Petrifilm ™	-
Faecal coliforms (organisms per 100 ml)	SABS SM 221 (2002)	-
Settleable Solids (ml/l)*	STD Method 2540 F (1992)	-
Chemical Oxygen Demand (mg/l)	SANS 6048 (2005)	0,08
Total Kjeldahl Nitrogen (mg/l)*	Hach 8075	-
Dissolved Oxygen (mg/l)*	STD Method 4500 O-G	-
Total Suspended Solids (mg/l)*	STD Method 2540 D (1992)	-
Volatile Suspended Solids (mg/l)*	STD Method 2540 E (1992)	-
Total Phosphate (mg/l as P)*	STD Method 4500-PB (1992) / Hach 8114	-
Ortho Phosphate (mg/l as P)*	Hach 8114	-
Copper (µg/l as Cu)	SANS 5203 (2005)	0,13

*** Tests marked "Not SANAS Accredited" in this report are not included in the SANAS Schedule of Accreditation for this laboratory.**

(Schedule of Accreditation excludes sampling)

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SOUTH AFRICA

Certificate of Analysis

WITZENBERG MUNICIPALITY

SAMPLE : **23 Samples of Drinking Water, marked**

1. **WBWMCR-001 : Reservoir. Final. Post-Chlorination ex Ceres**
2. **WBWMCR-002 : Wastewater Treatment Works ex Ceres (No Sample Received)**
3. **WBWMCR-003 : Nduli Intermediate School ex Ceres**
4. **WBWMCR-004 : John Steyn Library ex Ceres**
5. **WBWMCR-005 : Bella Vista Clinic ex Ceres**
6. **WBWMCR-006 : 41 Chris Hani ex Ceres**

DATE RECEIVED : **6 August 2010**

OUR REF. : **bm/148/2/2/2857**
27 August 2010

LAB DATA SHEET NO. : 10/2027

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	5,71	No Sample Received	5,74	6,27	6,38	5,97	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	3,2		3,1	3,7	3,2	3,2	<150	150-370	7 years
Turbidity (NTU)	2,0		1,7	1,6	1,7	1,9	<1	1-5	No Limit [d]
Langelier Saturation Index	-4,67		-4,94	-3,64	-3,60	-4,41	-	-	-
	mg/l		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	16		20	21	24	19	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-73,1		-37,2	-22,8	-26,1	-42,2	-	-	-
Total Alkalinity (as $CaCO_3$)	8,0		4,0	8,0	12,0	8,0	-	-	-
Total Hardness (as $CaCO_3$)	8,3		8,7	13,9	9,9	7,9	-	-	-
Calcium Hardness (as $CaCO_3$)	3,0		3,0	9,0	5,0	3,0	-	-	-
Calcium (as Ca)	1,2		1,2	3,6	2,0	1,2	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	5,3		5,7	4,9	4,9	4,9	-	-	-
Magnesium (as Mg)	1,3		1,4	1,2	1,2	1,2	<70	70-100	7 years
Sodium (as Na)	5,2		5,2	5,1	5,1	5,1	<200	200-400	7 years
Potassium (as K)	0,11		0,11	0,22	0,22	0,11	<50	50-100	7 years
Zinc (as Zn)	0,04		<0,01	<0,01	<0,01	0,02	<5.0	5.0-10.0	1 year
Chloride (as Cl)	13,9		11,9	11,9	15,8	15,8	<200	200-600	7 years
Fluoride (as F)	0,10		0,34	<0,10	0,20	0,36	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0		<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	30	No Sample Received	30	30	30	30	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15		<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0,31		0,36	0,36	0,40	0,33	<10	10-20	7 years
Nitrate Nitrogen (as N)	0,31		0,36	0,36	0,40	0,33	-	-	-
Nitrite Nitrogen (as N)	<0,08		<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l		µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	120		180	240	100	180	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40		<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	60		80	80	60	60	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	1	2	3	4	5	6	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	No Sample received	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Total Coliform Bacteria [g] **(count/100 ml)**	Nil		Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	Nil		Nil	3	10	1	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **7. WBWMOD-001 : 469 River Singel ex Op-die-Berg**
8. WBWMOD-002 : Clinic ex Op-die-Berg
9. WBWMOD-003 : Tap ex Op-die-Berg
10. WBWMPR-001 : Reservoir. Post-Chlorination ex Prince Alfred Hamlet
11. WBWMPR-002 : 266 Steve Tshewete St. Kliprug ex Prince Alfred Hamlet
12. WBWMPR-003 : Municipal Offices ex Prince Alfred Hamlet

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	4,99	4,79	4,75	4,98	5,54	5,58	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	6,4	6,4	6,1	2,9	3,5	3,3	<150	150-370	7 years
Turbidity (NTU)	0,47	0,46	0,53	0,45	0,70	1,0	<1	1-5	No Limit [d]
Langelier Saturation Index	Undef.	Undef.	Undef.	Undef.	-4,74	-4,54	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	6	<1	1	1	2	5	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-29,0	-65,3	-77,0	-30,2	-104	-95,5	-	-	-
Total Alkalinity (as $CaCO_3$)	<0,10	<0,10	<0,10	<0,10	8,0	8,0	-	-	-
Total Hardness (as $CaCO_3$)	12,9	13,1	13,1	5,2	7,4	9,1	-	-	-
Calcium Hardness (as $CaCO_3$)	5,5	5,3	5,3	2,5	3,8	5,5	-	-	-
Calcium (as Ca)	2,2	2,1	2,1	0,99	1,5	2,2	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	7,4	7,8	7,8	2,7	3,6	3,6	-	-	-
Magnesium (as Mg)	1,8	1,9	1,9	0,66	0,88	0,88	<70	70-100	7 years
Sodium (as Na)	8,1	8,3	8,3	5,0	5,6	5,5	<200	200-400	7 years
Potassium (as K)	0,11	0,11	0,11	0,11	0,33	0,22	<50	50-100	7 years
Zinc (as Zn)	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	13,9	13,9	15,4	11,9	9,9	13,9	<200	200-600	7 years
Fluoride (as F)	0,14	<0,10	<0,10	<0,10	0,13	<0,10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<4,0	<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	50	50	50	20	30	30	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	1,5	1,6	1,6	0,21	0,29	0,24	<10	10-20	7 years
Nitrate Nitrogen (as N)	1,5	1,6	1,6	0,21	0,29	0,24	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	140	40	140	420	260	20	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	64	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	240	260	260	120	40	80	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	7	8	9	10	11	12	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	1	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	17	1539	38	Nil	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **13 WBWMPR-004 : Tap ex Prince Alfred Hamlet**
14 WBWMTB-001 : Water Treatment Works. Final ex Tulbagh
15. WBWMTB-002 : Municipal Office ex Tulbagh
16. WBWMTB-003 : Bloekombossie Restaurant ex Tulbagh
17. WBWMTB-004 : Central Town ex Tulbagh
18. WBWMTB-005 : Clinic ex Tulbagh

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	5,47	10,93	8,26	7,91	7,58	7,54	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	3,1	26,5	6,8	6,5	6,8	6,7	<150	150-370	7 years
Turbidity (NTU)	0,81	1,2	2,3	0,71	1,9	2,9	<1	1-5	No Limit [d]
Langelier Saturation Index	-4,81	2,9	-1,43	-1,92	-2,12	-2,40	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	4	16	24	23	23	20	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-119	43,7	-5,5	-6,0	-6,5	-7,1	-	-	-
Total Alkalinity (as $CaCO_3$)	8,0	72,0	12,0	8,0	12,0	8,0	-	-	-
Total Hardness (as $CaCO_3$)	7,4	97,0	17,5	18,3	17,3	16,6	-	-	-
Calcium Hardness (as $CaCO_3$)	3,8	96,5	10,5	11,3	10,3	8,8	-	-	-
Calcium (as Ca)	1,5	38,6	4,2	4,5	4,1	3,5	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	3,6	<1	7,0	7,0	7,0	7,8	-	-	-
Magnesium (as Mg)	0,88	<0,30	1,7	1,7	1,7	1,9	<70	70-100	7 years
Sodium (as Na)	5,4	9,8	9,8	9,5	10,0	9,9	<200	200-400	7 years
Potassium (as K)	0,22	0,33	0,22	0,22	0,22	0,22	<50	50-100	7 years
Zinc (as Zn)	0,01	<0,01	<0,01	0,01	0,01	<0,01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	9,9	39,6	21,8	15,8	15,4	25,7	<200	200-600	7 years
Fluoride (as F)	<0,10	<0,10	<0,10	<0,10	0,24	0,12	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<4,0	<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	30	180	50	50	50	50	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0,26	0,13	<0,05	<0,05	<0,05	<0,05	<10	10-20	7 years
Nitrate Nitrogen (as N)	0,26	0,13	<0,05	<0,05	<0,05	<0,05	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	<10	<10	120	600	60	40	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	120	100	140	60	120	140	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	13	14	15	16	17	18	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	1	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	Nil	Nil	1	216	Nil	62	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **19 WBWMTB-006 : Wastewater Treatment Works Tap ex Tulbagh**
20 WBWMTB-007 : Shell Garage. Main Road ex Tulbagh
21 WBWMWO-001 : Water Treatment Works. Final ex Wolseley
22 WBWMWO-002 : No. 4. NPK. Pine Valley ex Wolseley
23 WBWMWO-003 : Municipal Office ex Wolseley
24 WBWMWO-004 : stamperstraat reservoir

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	7,21	7,20	5,17	4,98	4,95	4,66	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	6,3	7,2	1,8	2,2	2,0	2,4	<150	150-370	7 years
Turbidity (NTU)	0,79	1,5	0,83	0,65	1,1	0,72	<1	1-5	No Limit [d]
Langelier Saturation Index	Undef.	Undef.	Undef.	Undef.	Undef.	Undef.	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	23	21	7	4	3	3	<20	20-50	No Limit [b]
$CaCO_3$ Precipitation Potential	-9,1	-9,4	-16,6	-30,2	-33,9	-111	-	-	-
Total Alkalinity (as $CaCO_3$)	<1,0	<1,0	<1,0	<1,0	<1,0	<1,0	-	-	-
Total Hardness (as $CaCO_3$)	19,0	18,2	2,9	4,5	4,2	3,1	-	-	-
Calcium Hardness (as $CaCO_3$)	10,8	10,0	1,1	2,2	1,9	1,7	-	-	-
Calcium (as Ca)	4,3	4,0	0,44	0,88	0,77	0,66	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	8,2	8,2	1,8	2,3	2,3	1,4	-	-	-
Magnesium (as Mg)	2,0	2,0	0,44	0,55	0,55	0,33	<70	70-100	7 years
Sodium (as Na)	9,4	10,2	2,8	2,6	2,6	2,6	<200	200-400	7 years
Potassium (as K)	0,22	0,22	<0,09	<0,09	<0,09	<0,09	<50	50-100	7 years
Zinc (as Zn)	0,01	0,01	<0,01	0,18	0,02	0,03	<5.0	5.0-10.0	1 year
Chloride (as Cl)	21,8	31,7	9,9	15,8	5,9	15,8	<200	200-600	7 years
Fluoride (as F)	<0,10	0,34	<0,10	<0,10	<0,10	0,42	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<4,0	<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	50	60	20	20	20	20	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	<10	10-20	7 years
Nitrate Nitrogen (as N)	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	40	80	120	60	20	20	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<4,0	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	60	140	80	80	60	80	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
							Allowable Compliance Contribution [e]		
Sample Number :	19	20	21	22	23	24	95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	540	Nil	Nil	Nil	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

……

N. VAN BINSBERGEN Pr.Sci.Nat.
DIRECTOR

148/2/2/2857
30 August 2010

TO : WITZENBERG MUNICIPALITY
P O Box 44
CERES
6835

Attention : MR JOHAN SWANEPOEL

APPENDIX 1 : Specific Methods used for the Analysis of Parameters indicated in this report.

Parameter	Method	Estimated Uncertainty (%)
pH (at 25 ℃) - Lab	SABS 11 : (1990 – 3rd Revision)	0,019
pH (at 25 ℃) – Field*	SABS 11 : (1990 – 3rd Revision)	-
Langelier Saturation Index (at 25 ℃)*	Calculation	-
Conductivity (mS/m) (at 25 ℃)	STD Method 2501 A (1992)	2,15
Turbidity (NTU)	Hach 8237	1,81
Colour (mg/l as Pt)*	Hach 8025	-
Total Alkalinity (mg/l as $CaCO_3$)*	STD Methods 2320 (1992)	-
Total Hardness (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Calcium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Magnesium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,08
Chloride (mg/l as Cl)	SABS 202 (2nd Revision)	0,08
Fluoride (mg/l as F)	Hach 8029	0,19
Iron (µg/l as Fe)	SANS 5207 (2004)	0,09
Manganese (µg/l as Mn)	SANS 5209 (2005)	0,09
Aluminium (µg/l as Al)	SANS 6169 (2005)	0,14
Calcium Carbonate Precipitation Potential*	Calculation	-
Free Chlorine (mg/l)*	Lovibond Method 3	-
Sodium (mg/l as Na)	SANS 6050 (2004)	0,08
Potassium (mg/l as K)	STD Method 3111 B (1992)	0,07
Zinc (mg/l as Zn)	SANS 5214 (2005)	0,08
Nitrate Nitrogen (mg/l as N)	Hach 8150	0,12
Nitrate Nitrogen (mg/l as N)	Lovibond Method using Brucine	0,057
Nitrite Nitrogen (mg/l as N)	Lovibond Method	0,08
Nitrate & Nitrite Nitrogen (mg/l as N)	Hach 8150	-
Ammonia (mg/l as N)	STD Method 4500-NH_3:C (1992)	0,07
Sulphate (mg/l as SO4)	Hach 8051	0,17
Total Dissolved Solids*	STD Method 2501 A (1992)	1,63
E.coli (organisms per 100 ml)	SABS 221 (2002)	-
Coliforms (organisms per 100 ml)	SABS 221 (2002)	-
Total Plate Count (organisms per ml)	Petrifilm ™	-
Faecal coliforms (organisms per 100 ml)	SABS SM 221 (2002)	-
Settleable Solids (ml/l)*	STD Method 2540 F (1992)	-
Chemical Oxygen Demand (mg/l)	SANS 6048 (2005)	0,08
Total Kjeldahl Nitrogen (mg/l)*	Hach 8075	-
Dissolved Oxygen (mg/l)*	STD Method 4500 O-G	-
Total Suspended Solids (mg/l)*	STD Method 2540 D (1992)	-
Volatile Suspended Solids (mg/l)*	STD Method 2540 E (1992)	-
Total Phosphate (mg/l as P)*	STD Method 4500-PB (1992) / Hach 8114	-
Ortho Phosphate (mg/l as P)*	Hach 8114	-
Copper (µg/l as Cu)	SANS 5203 (2005)	0,13

* **Tests marked "Not SANAS Accredited" in this report are not included in the SANAS Schedule of Accreditation for this laboratory.**

(Schedule of Accreditation excludes sampling)

A.L. ABBOTT AND ASSOCIATES (PTY) LTD

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SOUTH AFRICA

Certificate of Analysis

WITZENBERG MUNICIPALITY

SAMPLE : **24 Samples of Drinking Water, marked**

1. **WBWMCR-001 : Reservoir. Final. Post-Chlorination ex Ceres**
2. **WBWMCR-002 : Wastewater Treatment Works ex Ceres (No Sample Received)**
3. **WBWMCR-003 : Nduli Intermediate School ex Ceres**
4. **WBWMCR-004 : John Steyn Library ex Ceres**
5. **WBWMCR-005 : Bella Vista Clinic ex Ceres**
6. **WBWMCR-006 : 41 Chris Hani ex Ceres**

DATE RECEIVED : **6 September 2010**

OUR REF. : **sc/148/2/2/3085** **LAB DATA SHEET NO. : 10/2324**
13 September 2010

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	8,30	6,64	7,64	6,86	6,73	5,57	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	3,4	3,9	3,4	3,9	3,2	3,2	<150	150-370	7 years
Turbidity (NTU)	2,0	2,0	3,0	1,0	2,0	1,0	<1	1-5	No Limit [d]
Langelier Saturation Index	-1,99	-3,32	-1,83	-2,90	-3,37	-4,75	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	2	6	4	7	5	4	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	12,0	8,0	60,0	12,0	12,0	8,0	-	-	-
Total Hardness (as $CaCO_3$)	5,2	13,3	8,6	12,6	9,1	8,8	-	-	-
Calcium Hardness (as $CaCO_3$)	2,5	8,0	3,3	8,5	3,8	3,5	-	-	-
Calcium (as Ca)	0,99	3,2	1,3	3,4	1,5	1,4	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	2,7	5,3	5,3	4,1	5,3	5,3	-	-	-
Magnesium (as Mg)	0,66	1,3	1,3	0,99	1,3	1,3	<70	70-100	7 years
Sodium (as Na)	5,1	5,1	5,1	5,1	5,1	5,1	<200	200-400	7 years
Potassium (as K)	0,44	0,44	0,44	0,44	0,44	0,44	<50	50-100	7 years
Zinc (as Zn)	0,02	0,02	<0,01	<0,01	<0,01	0,02	<5.0	5.0-10.0	1 year
Chloride (as Cl)	12,4	10,3	8,2	8,2	6,2	12,4	<200	200-600	7 years
Fluoride (as F)	<0,10	<0,10	0,32	<0,10	<0,10	<0,10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<4,0	<4,0	<4,0	<4,0	5,0	<400	400-600	7 years

Sample Number :	1	2	3	4	5	6	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	30	30	30	30	30	30	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0,33	0,30	0,32	0,31	0,36	0,29	<10	10-20	7 years
Nitrate Nitrogen (as N)	0,33	0,30	0,32	0,31	0,36	0,29	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	120	120	140	120	260	180	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	60	80	60	60	60	60	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	1	2	3	4	5	6	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	800	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	Nil	Nil	Nil	8	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **7. WBWMOD-001 : 469 River Singel ex Op-die-Berg**
8. WBWMOD-002 : Clinic ex Op-die-Berg
9. WBWMOD-003 : Tap ex Op-die-Berg
10. WBWMPR-001 : Reservoir. Post-Chlorination ex Prince Alfred Hamlet
11. WBWMPR-002 : 266 Steve Tshewete St. Kliprug ex Prince Alfred Hamlet
12. WBWMPR-003 : Municipal Offices ex Prince Alfred Hamlet

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	4,99	5,34	4,81	5,68	5,66	5,72	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	6,5	6,6	8,7	2,9	2,9	4,0	<150	150-370	7 years
Turbidity (NTU)	2,0	1,0	3,0	2,0	2,0	2,0	<1	1-5	No Limit [d]
Langelier Saturation Index	Undef.	-4,57	Undef.	-4,78	-4,80	-4,72	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	<1	<1	<1	<1	<1	<1	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	<1,0	8,0	<1,0	8,0	8,0	4,0	-	-	-
Total Hardness (as $CaCO_3$)	14,7	17,9	13,9	6,6	7,4	10,2	-	-	-
Calcium Hardness (as $CaCO_3$)	6,5	9,3	5,3	2,5	2,5	5,3	-	-	-
Calcium (as Ca)	2,6	3,7	2,1	0,99	0,99	2,1	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	8,2	8,6	8,6	4,1	4,9	4,9	-	-	-
Magnesium (as Mg)	2,0	2,1	2,1	0,99	1,2	1,2	<70	70-100	7 years
Sodium (as Na)	8,5	8,3	8,3	5,1	5,1	5,4	<200	200-400	7 years
Potassium (as K)	0,55	0,44	0,44	0,33	0,22	0,44	<50	50-100	7 years
Zinc (as Zn)	0,02	0,02	0,01	<0,01	<0,01	<0,01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	12,4	12,4	12,4	8,2	6,2	12,4	<200	200-600	7 years
Fluoride (as F)	<0,10	<0,10	<0,10	<0,10	<0,10	<0,10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	4,0	<4,0	<4,0	<4,0	<4,0	<400	400-600	7 years

Sample Number :	7	8	9	10	11	12	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	60	60	70	20	20	30	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	2,0	1,4	1,6	0,16	0,16	0,20	<10	10-20	7 years
Nitrate Nitrogen (as N)	2	1,4	1,6	0,16	0,16	0,2	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	160	120	200	140	160	80	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	220	200	240	90	20	80	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	7	8	9	10	11	12	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	1	Nil	Nil	1	Nil	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **13 WBWMPR-004 : Tap ex Prince Alfred Hamlet**
14 WBWMTB-001 : Water Treatment Works. Final ex Tulbagh
15. WBWMTB-002 : Municipal Office ex Tulbagh
16. WBWMTB-003 : Bloekombossie Restaurant ex Tulbagh
17. WBWMTB-004 : Central Town ex Tulbagh
18. WBWMTB-005 : Clinic ex Tulbagh

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	4,89	10,68	9,54	8,96	8,67	8,31	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	3,9	22,5	6,9	6,6	6,5	6,5	<150	150-370	7 years
Turbidity (NTU)	1,0	1,0	2,0	2,0	1,0	3,0	<1	1-5	No Limit [d]
Langelier Saturation Index	Undef.	2,53	-0,16	-0,73	-0,96	-1,3	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	<1	12	11	14	10	10	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	<1,0	64,0	12,0	12,0	16,0	20,0	-	-	-
Total Hardness (as $CaCO_3$)	9,1	82,9	18,9	22,4	19,7	18,2	-	-	-
Calcium Hardness (as $CaCO_3$)	3,8	78,8	10,3	10,5	9,0	7,5	-	-	-
Calcium (as Ca)	1,5	31,5	4,1	4,2	3,6	3,0	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	5,3	4,1	8,6	11,9	10,7	10,7	-	-	-
Magnesium (as Mg)	1,3	0,99	2,1	2,9	2,6	2,6	<70	70-100	7 years
Sodium (as Na)	5,4	9,6	9,4	9,5	9,5	9,2	<200	200-400	7 years
Potassium (as K)	0,44	0,55	0,44	0,44	0,44	0,44	<50	50-100	7 years
Zinc (as Zn)	<0,01	<0,01	0,02	0,01	<0,01	<0,01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	12,4	20,6	18,6	8,2	16,5	14,4	<200	200-600	7 years
Fluoride (as F)	0,14	0,21	0,22	0,13	<0,10	0,34	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	<4,0	<4,0	<4,0	4,0	9,0	<400	400-600	7 years

Sample Number :	13	14	15	16	17	18	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	30	160	60	60	60	60	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	0,20	<0,05	<0,05	<0,05	<0,05	<0,05	<10	10-20	7 years
Nitrate Nitrogen (as N)	0,2	<0,05	<0,05	<0,05	<0,05	<0,05	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	20	200	80	<10	<10	<10	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	76	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	100	60	120	140	60	80	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS

(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
Sample Number :	13	14	15	16	17	18	Allowable Compliance Contribution [e]		
							95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	Nil	Nil	Nil	Nil	88	Nil	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

SAMPLE : **19 WBWMTB-006 : Wastewater Treatment Works Tap ex Tulbagh**
20 WBWMTB-007 : Shell Garage. Main Road ex Tulbagh
21 WBWMWO-001 : Water Treatment Works. Final ex Wolseley
22 WBWMWO-002 : No. 4. NPK. Pine Valley ex Wolseley
23 WBWMWO-003 : Municipal Office ex Wolseley
24 WBWMWO-004 : stamperstraat reservoir

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
pH (at 25°C)	8,10	7,91	7,56	7,41	7,09	6,87	5.0-9.5	4.0-10.0	No Limit [c]
Conductivity (at 25°C) (mS/m)	7,0	7,1	1,0	1,4	1,0	1,0	<150	150-370	7 years
Turbidity (NTU)	2,0	1,0	2,0	2,0	1,0	3,0	<1	1-5	No Limit [d]
Langelier Saturation Index	-1,46	-2,08	-3,06	-3,11	-3,51	-3,82	-	-	-
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Colour (as Pt)	12	6	<1	<1	6	3	<20	20-50	No Limit [b]
Total Alkalinity (as $CaCO_3$)	16,0	8,0	12,0	12,0	8,0	8,0	-	-	-
Total Hardness (as $CaCO_3$)	22,4	19,3	6,0	6,3	6,6	6,7	-	-	-
Calcium Hardness (as $CaCO_3$)	10,5	7,8	1,1	1,4	1,7	1,4	-	-	-
Calcium (as Ca)	4,2	3,1	0,44	0,55	0,66	0,55	<150	150-300	7 years
Magnesium Hardness (as $CaCO_3$)	11,9	11,5	4,9	4,9	4,9	5,3	-	-	-
Magnesium (as Mg)	2,9	2,8	1,2	1,2	1,2	1,3	<70	70-100	7 years
Sodium (as Na)	9,2	9,4	2,5	2,3	2,3	2,3	<200	200-400	7 years
Potassium (as K)	0,44	0,44	<0,09	<0,09	<0,09	<0,09	<50	50-100	7 years
Zinc (as Zn)	0,02	<0,01	<0,01	<0,01	0,02	0,01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	16,5	16,5	4,1	4,1	4,1	6,2	<200	200-600	7 years
Fluoride (as F)	<0,10	<0,10	<0,10	0,19	<0,10	<0,10	<1.0	1.0-1.5	1 year
Sulphate (as SO_4)	<4,0	4,0	<4,0	<4,0	<4,0	6,0	<400	400-600	7 years

Sample Number :	19	20	21	22	23	24	SANS 241 – 2006 (Drinking Water)		
							Class I (Recomm. Operational Limit)	Class II (Max. Allow. for Limited Duration)	Class II Water Consumption Period, [a] max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	50	50	10	10	10	10	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit [d]
Nitrate & Nitrite Nitrogen (as N)	<0,05	<0,05	<0,05	<0,05	<0,05	0,12	<10	10-20	7 years
Nitrate Nitrogen (as N)	<0,05	<0,05	<0,05	<0,05	<0,05	0,12	-	-	-
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	<0,08	<0,08	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	200	40	100	120	120	120	<200	200-2 000	7 years [b]
Manganese (as Mn)	<40	<40	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	40	100	40	80	40	80	<300	300-500	1 year

[a]	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.
[b]	The limits given are based on aesthetic aspects.
[c]	No primary health effect – low pH values can result in structural problems in the distribution system.
[d]	These values can indicate process efficiency and risks associated with pathogens.

MICROBIOLOGICAL REQUIREMENTS
(SANS 241 of 2006 – Drinking Water)

1	2						3	4	5
							Allowable Compliance Contribution [e]		
Sample Number :	19	20	21	22	23	24	95% of samples, min.	4% of samples, max.	1% of samples, max.
							Upper Limits		
E.coli [f] **(count/100 ml)**	Nil	Nil	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Faecal Coliforms (count/100 ml)	-	-	-	-	-	-	-	-	-
Total Coliform Bacteria [g] **(count/100 ml)**	Nil	Nil	300	200	Nil	100	-	-	-
Heterotrophic Plate Count [h] **(count/ml)**	3564	4221	32	36	Nil	10	-	-	-

[e]	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.
[f]	Definitive preferred indicator of faecal pollution.
[g]	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.
[h]	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.

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N. VAN BINSBERGEN Pr.Sci.Nat.
DIRECTOR

148/2/2/3085
13 September 2010

TO : WITZENBERG MUNICIPALITY
P O Box 44
CERES
6835

Attention : MR JOHAN SWANEPOEL

APPENDIX 1 : Specific Methods used for the Analysis of Parameters indicated in this report.

Parameter	Method	Estimated Uncertainty (%)
pH (at 25 °C) - Lab	SABS 11 : (1990 – 3rd Revision)	0,019
pH (at 25 °C) – Field*	SABS 11 : (1990 – 3rd Revision)	-
Langelier Saturation Index (at 25 °C)*	Calculation	-
Conductivity (mS/m) (at 25 °C)	STD Method 2501 A (1992)	2,15
Turbidity (NTU)	Hach 8237	1,81
Colour (mg/l as Pt)*	Hach 8025	-
Total Alkalinity (mg/l as $CaCO_3$)*	STD Methods 2320 (1992)	-
Total Hardness (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Calcium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,09
Magnesium (mg/l as $CaCO_3$)	SABS SM 1265 (2000)	0,08
Chloride (mg/l as Cl)	SABS 202 (2nd Revision)	0,08
Fluoride (mg/l as F)	Hach 8029	0,19
Iron (µg/l as Fe)	SANS 5207 (2004)	0,09
Manganese (µg/l as Mn)	SANS 5209 (2005)	0,09
Aluminium (µg/l as Al)	SANS 6169 (2005)	0,14
Calcium Carbonate Precipitation Potential*	Calculation	-
Free Chlorine (mg/l)*	Lovibond Method 3	-
Sodium (mg/l as Na)	SANS 6050 (2004)	0,08
Potassium (mg/l as K)	STD Method 3111 B (1992)	0,07
Zinc (mg/l as Zn)	SANS 5214 (2005)	0,08
Nitrate Nitrogen (mg/l as N)	Hach 8150	0,12
Nitrate Nitrogen (mg/l as N)	Lovibond Method using Brucine	0,057
Nitrite Nitrogen (mg/l as N)	Lovibond Method	0,08
Nitrate & Nitrite Nitrogen (mg/l as N)	Hach 8150	-
Ammonia (mg/l as N)	STD Method 4500-NH_3:C (1992)	0,07
Sulphate (mg/l as SO4)	Hach 8051	0,17
Total Dissolved Solids*	STD Method 2501 A (1992)	1,63
E.coli (organisms per 100 ml)	SABS 221 (2002)	-
Coliforms (organisms per 100 ml)	SABS 221 (2002)	-
Total Plate Count (organisms per ml)	Petrifilm ™	-
Faecal coliforms (organisms per 100 ml)	SABS SM 221 (2002)	-
Settleable Solids (ml/l)*	STD Method 2540 F (1992)	-
Chemical Oxygen Demand (mg/l)	SANS 6048 (2005)	0,08
Total Kjeldahl Nitrogen (mg/l)*	Hach 8075	-
Dissolved Oxygen (mg/l)*	STD Method 4500 O-G	-
Total Suspended Solids (mg/l)*	STD Method 2540 D (1992)	-
Volatile Suspended Solids (mg/l)*	STD Method 2540 E (1992)	-
Total Phosphate (mg/l as P)*	STD Method 4500-PB (1992) / Hach 8114	-
Ortho Phosphate (mg/l as P)*	Hach 8114	-
Copper (µg/l as Cu)	SANS 5203 (2005)	0,13

*** Tests marked "Not SANAS Accredited" in this report are not included in the SANAS Schedule of Accreditation for this laboratory.**

(Schedule of Accreditation excludes sampling)